FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION
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7th International Conference

CONFERENCE PROCEEDINGS

THEME
CURRICULUM ISSUES IN SCIENCE AND TECHNOLOGY EDUCATION IN THE 21ST CENTURY

DATE 1ST – 5TH OCTOBER, 2019

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

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ACKNOWLEDGEMENTS

Local Organizing Committee of the 7th International Conference of School of Science and Technology Education (SSTE), Federal University of Technology, Minna, appreciates the Management of the University for the Unalloyed Support given to the team which led to the success of this Conference. We also wish to express our profound gratitude for the assistance rendered by the University Management especially in disseminating information relating to this Conference using the University website, Campus News, and FUT Search FM.

Thank the Dean, School of Science and Technology Education (SSTE) for hosting this Conference despite the economic situation in the country. His encouragement, advice, and moral support gave the Local Organizing Committee the strength to complete this task and make sure the Conference is successful.

Sincerely thank the academic staff of the School and University Community for their essential roles played towards the success of the Conference. We thank the non-teaching staff for their roles which contributed to the success of this Conference.

Efforts of the Editorial Board are commendable for making sure that the Book of Proceedings was ready before the arrival of the participants. We appreciate the efforts of the Keynote presenter, Lead Paper presenter, and Workshop facilitator for attending this Conference despite their tight schedule.

We also commend the undergraduate and postgraduate students of the School for sparing their time for participating in all the events. We thank God Almighty for the strength given to the LOC members to discharge their enormous tasks.

PREFACE

The 21st-century education is about giving students the skills they need to succeed in this new world and helping them develop the confidence to practice those skills. With so much information readily available to them, the 21st-century skills focus more on making sense of that information, sharing and using it in smart ways. There are several reasons for questioning how well the current school curriculum is equipping students for life and work in the 21st Century.

The 21st-century curriculum also suggests "abandonment of textbook-driven knowledge, teacher-centered mode of instruction, paper and pencil schooling". It means a new way of understanding the concept of "knowledge" and a new definition of the "educated person". Consequently, a new way of designing and delivering the curriculum is required. The twenty-first-century curriculum is: "interdisciplinary, project-based, and research-driven. It is connected to the community – local, state, national and global.

Hence, the theme of this conference is apt and provides opportunities where experts brainstorm so that international communities can benefit from one another and also respond to curriculum issues in science and technology education in the 21st century. Curriculum issues are capable of enhancing quality teaching and learning process. It is worthy to note that, the implementation of the 21st-century curriculum would have a greater influence on the quality of manpower injected into the labour market which may determine the economic growth of any nation.

The theme and sub-themes of this conference, "Curriculum Issues in Science and Technology Education in the 21st Century" are based on the prevailing situation of poor quality education in developing nations. I am sure this conference has provided an avenue for researchers and educators to share their ideas on the 21st-century curriculum issues that can enhance quality education and self-reliance in underdeveloped and developing nations across the world. I hope the theme and sub-themes meet the needs of the stakeholders in education.
The sub-themes are:

- Curriculum Issues and Security Challenges
- Curriculum Issues and Labour Market Demands
- Curriculum Issues and Advancement in Science Education
- Curriculum Issues and Innovations in Technology Education
- Curriculum Issues and Industrial Demands
- Curriculum Issues and Health Demands
- Curriculum Issues in Language and Information Communication and Technology
- Curriculum Issues and Innovations in Special Education
- Curriculum Issues in Agricultural Science and Food Security
- Curriculum Issues in Entrepreneurial Education

The Local Organizing Committee is thankful to the participants of this year's conference for their contributions.
God bless you all.

Prof. Gambari, AmosaIsiaka
LOC Chairman/Editor

AN ADDRESS DELIVERED BY PROFESSOR ATSUMBE BERNARD NUMGWO, DEAN SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION ON THE OCCASION OF THE SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION 7TH INTERNATIONAL CONFERENCE ON "CURRICULUM ISSUES IN SCIENCE AND TECHNOLOGY EDUCATION IN THE 21ST CENTURY".

HOLDING FROM 1ST-5TH OCTOBER 2019 AT THE CENTER FOR PRELIMINARY AND EXTRAMURAL STUDIES (CPES) FEDERAL UNIVERSITY OF TECHNOLOGY MINNA NIGER STATE NIGERIA.

PROTOCOL

It is with profound gratitude to Almighty God that I welcome you all, on behalf of staff and students of the School of Science and Technology Education. I appreciate the Vice-Chancellor and his management family team for their continued support and good will to the school.

Distinguished guest, ladies and gentlemen, permit me to specially welcome a man carefully chosen and singled out for the Keynote Address for this conference. He is a man of impeccable track record, both in academic and service. He is Professor Geoffrey Lautenback, from University of Johannesburg South Africa. He is a professor of Learning Technology. He shares a great interest in the Conference Theme. I also want to welcome an erudite scholar and professor of TVET, Professor Simon Medugu Yalams Director Human Resource Development, Abubakar Tafawa Balewa University (ATBU) Bauchi who will give the lead paper.

We equally want to welcome our distinguished guest who have honoured our invitation to be part of this great occasion, to all our participants who have travelled from different Universities and other academic institutions in Nigeria and overseas, we appreciate you all for your interest in our conference. I want to specially congratulate the conference organizing committee members for a successful and diligent planning that have brought this large gathering of International and National experts who will be deliberating and sharing knowledge on issues that will be raised in the course of this conference.

Science and technology have been identified as the key driver for national and socio-economic development of any nation because of it's cross cutting-edge impact. This is because for the past hundred 100 years we have experienced the greatest social and scientific advances in the world system. Since the industrial revolution of the 18th century. We have learned to communicate by means never even thought of or imagined before this century. The integration of technologies and systems have allowed for the creation of inventions that have carried us to the moon, brought the world's images into our homes by the flick of a switch. These are all due to the vision and the knowledge of people using Science and Technology to control the <<Human-made world>> and improve their surroundings.

Although Nigeria as a nation is making some reasonable contribution to the development of Science and Technology we still as a nation have a long way to go. Our snail speed in the area of Science and Technology have actually been blamed on the nature and type of curriculum we operate. Curriculum is the medium through which educational institutions seek to translate the societal values into concrete realities.

Curriculum is central to education at all levels in the world. It is indeed an instruments for possible education. Curriculum is defined as the heartthrob of development and progress. As education is central to the society so is curriculum the heart of and life wire of education (Alade, 2006). The implication of this is that, as no society can rise beyond the level of her educational system so it is that no society can develop, grow in any ramification beyond the content of her curriculum. The content of our science and technology curriculum determines how well we can develop scientifically, industrially and economically. Our ability to join the committee of nations is hinged on the content of our curriculum.

Meanwhile Mkpa (2010) have described the present curriculum of science and technology in both primary and secondary schools in Nigeria as inadequate, shallow, obsolete and incapable of responding to the present challenges of technological needs of Nigerian populace. He said the present curriculum is incapable of producing for the nation quality of youths with the right orientations capable of salvaging the nation from adverse economic effects of inadequate production of goods and services.

Some of these defects boarders on contents and organization of body of knowledge to be taught. The contents are a combination of dejointed topics in each of the science subjects with no unifying concepts to make teaching and learning easily attainable. The general science and basic technology taught at the lower classes of the secondary schools are just mere selection of some topics so selected. For example, the curriculum of science and technology of several developed nations of the world are integrated however, that is not the case with us in Nigeria as various curricular are pursued on a subject basis; they are no elements of vertical and horizontal integration. Again, the curriculum of science and technology at the senior secondary level do not appear to meet the needs of the society which the school serve. No evidence of any proper scientific skills and altitude acquired by the student.

The problem of the curriculum of science and technology education in Nigeria is not only bedeviled by the matter of content and organization but according to Atsumbe 2016 the following critical areas that make up for a functional and dynamic curriculum are begging for attention. For example:

- Obsolete, outdated and irrelevant curriculum
- Inadequate and unqualified science and technology teachers
- Obsolete instructional and pedagogical approaches
- Poor study environment
- Dilapidated school infrastructures
- Poor funding of science and technology programmes
- Poor curriculum implementation and evaluation

It is important to plead with all of us scholars that the following issues must be addressed and answers must be provided before we leave this conference. This is because they are curriculum related problems.

- ➢ Climate Change
- ➢ Energy Shortage
- ➢ HIV/AID Pandemic
- ➢ Food Security
- ➢ ICT Challenges
- ➢ Modern Instructional Approaches
- ➢ Reality of poverty in Nigeria

- And unemployment to mention but a few

How can we overcome these challenges? It is my hope and believe that this conference will provide relevant answers that will deal with curriculum issues in the 21st century. I therefore plead with us to use this conference as a platform to come up with a strong communique that will be a spring board for addressing the myriads of problems facing us as a nation.

Mr. Chairman, distinguished ladies and gentlemen, once again let me express my unconditional gratitude to my dynamic Vice-Chancellor, key note speakers, lead paper presenter, all invited guest, for finding time amidst your high schedule to honour our invitation.

To all our participants, I wish you successful deliberations at the plenary. Please avail yourselves of the natural beauty of our two campuses and feel at home while in Minna the capital of Niger State. (The Power State)

Distinguish ladies and gentlemen, thank you for your rapt attention and God bless you.

A SPEECH PRESENTED

BY

THE VICE-CHANCELLOR, PROFESSOR ABDULLAHI BALA

AT THE OPENING CEREMONY OF THE
7TH INTERNATIONAL CONFERENCE OF THE SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION (STE), FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

DATE: 1st – 5th OCTOBER, 2019.

Protocols:
The Deputy Vice Chancellor,
The Registrar
The Keynote Speaker, Prof. Geoffrey Lautenbach (University of Johannesburg)
Lead Paper Presenter, Prof. Simon M. Yalams (ATBU Bauchi)
Deans, Directors and Heads of Department here present
Ladies and Gentlemen

It is my honour and pleasure, on behalf of the Governing Council, Management, Staff and Students of this prestigious citadel of learning, to welcome you to the 7th International Conference of the School of Science and Technology Education, Federal University of Technology, Minna.

The world is evolving, and a newset of skills have emerged which have helped us develop solutions to problems that were once considered to be impossible to resolve. However, to successfully thrive in today's society, a set of skills have emerged which are required for success.

Identifying the skills most needed to drive innovations and success in the 21st century is at the forefront of public discourse globally. These skills which are referred to as 21stcentury skills empower individuals and nations to compete favourably in the global market. These skills include;

- Ability to think critically and creatively
- Ability to collaborate and work in teams
- Oral and written communication skills
- Adaptability and flexibility
- Others are digital literacy; ICT literacy, computer literacy, and Media literacy, among others.

To help learners acquire these critical skills, there is the need for a paradigm shift from the traditional curriculum (where learning is teacher-centered and emphasis on lower thinking skills) to the 21st-century science and technology education curriculum. The higher institution, especially the university, will lose their relevance if they do not evolve research, teaching and learning that could align with the present realities in our society.

In today's knowledge-based economies, science and technology education are vital prerequisites to address the full range of issues bedeviling our society such as poverty, health issues, banditry, kidnapping and unemployment, among others. Therefore, if nations especially developing countries like Nigeria pay lip service with the issue of adequate investment in science and technology education, then the quest for food security, self-reliance and sustainable development will be a mirage.

May I observe that there is a marked difference between the 21st century and a few decades ago. For instance, in today's scenario, economy is global, and the marketing barriers between countries are broken by technology, thus making the world a global village. Nevertheless, before the advent of the 21st century, the economy and market were not global but restricted by territories. Developed nations such as UK, China, Canada, Finland, United States and many other countries have taken advantage of the global nature of the world to identify their national priorities and are investing strategically to grow and sustain their developments. It is important to note that there are several fundamental factors common among the developed nation. Two of these factors stand out: Quality and meaningful learning of science and technology education at all levels of education and the use of scientific and technological knowledge for wealth creation. Therefore, it is logical to conclude that the sure way to reduce the gap between developed and developing countries is to prioritise and invest meaningfully in science and technological education.

Consequently, the theme of this conference **"CURRICULUM ISSUES IN SCIENCE AND TECHNOLOGY EDUCATION IN THE 21ST CENTURY"** is both appropriate and timely. The theme of this conference clearly shows that the status quo in terms of classroom instructional practices cannot remain if the aim of teaching for the 21st century is to be achieved. A glance at the Subthemes of this conference shows a range of contemporary educational issues from; **curricular issues and labour demands**, **security challenges, agricultural science and food security, among others.** The necessity to reflect on these different perspectives stress the relationship between science, technology, mathematics and engineering and society. Therefore, the subthemes of the presentation planned for the next few days reveal amazing diversities and will promote a broad range of scholarly discourse among participants.

In view of the chosen theme and sub-themes of this conference, there is no gainsaying that in an evolving global society, it is imperious that educational curricular must be restructured not only to help students master subject content knowledge but the competencies and skills required to prepare individuals for life and work for the 21st century and beyond(Partnership for 21st Century Learning, 2015). Consequently, this conference has provided the opportunity for constructive discussion about re-engineering science and technology curriculum for a more sustainable and economic viable society.

I personally believe that there is a need for more research and policy adjustment in science and technology education to ensure that we align our investment with our natural interest and goals. We need to focus on important areas such as STEM Education so that we can make a huge difference for ourselves and the changing world by investing strategically. Our society is confronted with the issues of climate change, poverty, unemployment, food supply, banditry, among others. Our ability to provide a solution to these problems is enshrined in scientific and technological knowledge and discovery. It is our task, therefore, to nurture and prepare future generations with competencies and skills in STEM education to respond appropriately to these issues. The government must, as a matter of urgency, design policies that will promote best practices in STEM education, engage in aggressive training and retraining of teachers in innovative curriculum relevant to the 21st-century and increase funding of education.

Ladies and gentile men, an international conference like this provides a crucial opportunity for researchers, policymakers and other educational stakeholders to share experiences. I am thankful to the many experts who have come to share their knowledge and experiences in this special conference. I also welcome the government representatives, captains of industry and members of Non-Governmental Organizations (NGOs) who have joined us. I am sure you will have a fruitful and rewarding discourse in the next few days.

Before I conclude may I cease this opportunity to congratulate the Dean School of Science and Science Education, Heads of Department and the Local Organising Committee for putting together this conference. Please, let end this speech by wishing you a pleasant and conference participation.

Thank you for listening.

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RETHINKING CURRICULUM ISSUES IN TVET AND SCIENCE EDUCATION IN THE 21ST CENTURY

A Lead Paper Presented at the SSTE 7th International Conference, Federal University of Technology Minna; October 1-5th, 2019

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Abstract
This paper explores global trends in education generally and how these impact on the TVET and Science Education development in Nigeria. The paper pays particular attention to issues that relates to the curriculum, the 21st century learners and the requisite teachers and the competencies required for these categories of learners in the digital age. The paper argues that, some reforms in especially the curriculum of TVET and Science Education are required in order to make them more attractive and globally competitive. Some of the contemporary ingredients needed to be injected in the curriculum to make it viable in this generation includes practices such as the Competency-Based approach, the Problem-Based (PBL), the Greening TVET, and the Integrated STEM modalities among others. The paper concluded with a strong call for action on the part of all TVET and Science Education stakeholders in Nigeria.

Introduction

"…On these issues of Transforming TVET in Africa, we shall not stop saying it… – Yalams (2019)"

Good morning ladies and gentlemen, this is the second time this year, I am opportune to speak as a leader paper presenter on curriculum issues relating to TVET in Nigeria. The first was at the Association of Vocational and Technical Educators of Nigeria (AVTEN) in Ebonyi State University, in July, 2019. From these presentations, I have discovered that, something fundamentally needs to be done on curriculum in the educational system of Nigeria. But first to the management of this University and particularly the leadership of the School of Science and Technology Education (SSTE), I am highly elated for being considered for the second time in its International Conference series to deliver a lead paper. Again, I say thank you all for the honour.

I have chosen to start my paper from the bottom of the theme, understanding the terms ***21st century learners*** and ***teachers***, their characteristics; followed by the challenges faced due to numerous changes in the education industry globally owing to the market competitiveness. Yalams, (2019) after a quick review of literature on TVET, posited that, the contemporary TVET system is that type of education that prepares and equips its products with the knowledge, attitudes and skills needed for the 21st Century world of work. This system focuses on high quality employability skills for productivity and global competitiveness, it speaks to innovative ideas aimed at solving problems in all fields of endeavour. Vocational Technology and Science Education educate and empower their products with soft, employability, scientific, technological, vocational, engineering, mathematical and entrepreneurial skills, and citizenship & lifelong learning skills that promote national, regional and global economic growth and market competitiveness. These are systems whose' curriculum foster equality, ethical values and environmental protection among others. The teaching and learning of these core values in the 21st century require deep understand and definite contemporary approaches. But first we probably need to be reminded on what really is this 21st century. According to Wikipedia (n.d.), the 21st Century is the current century of the Anno Domini era or common Era, in accordance with the Gregorian Calendar. It begun on Janauary1, 2001, and will end on December 31, 2100. It is the first century of the 3rd Millennium which is also synonymous with Digital Information Technology generation. The next question would be who then are the 21st Century learners, and what are their characteristics? Alvin Toffler (n.d.) ***said "The illiterate of the 21st Century will not be those who cannot read and write but those who cannot learn, unlearn and relearn".***

In the same vein, Mark Treadwell (n.d.) a renown Australian educationist**,** forecast and cautioned against what he described as the collision of three great storms in the 21st Century, and said "…***learning is no longer about the units or volumes of work with its versed content, rather the focus should be on "learning how to learn" and not how much content is learned…".*** According to him, what young people need to learn in this generation is how to be Lifelong Learners (LLL). He further stated "Teachers of this generation have far more challenges spanning the demands, which are inclusive of those relating to the changing curriculum, the new teaching technologies in schools, and how we can build our capacities to meet these 21st century challenges". Thus, the expectation of this conference is that, participants will have deeper understanding of the real issues facing the TVET and Science Education curriculum in this era; the requisite instructional delivery practices in the light of current global trends; and the shift in the education industry generally, as they specifically affect TVET and Science education in Nigeria. For any meaningful transformation to take place in the education system, there must be a justification for it. It is common knowledge that, the tools and the ways in which TVET and Science Education were delivered 10 - 15 years ago are no longer the same being used for delivering them today in many developed countries. Thus, we need to acquaint ourselves with some of these changes as they affect they aspects of education in Nigeria.

It may interest you to note that, across the world of TVET and Science education in the developed economies, the high sounding themes and programmes these days are those of logical abstract thinking to diagnose problems, do research, design and implement those solutions to the identified problems of the society often as team members, and transforming teachers from those who impart knowledge to those who facilitate learning, innovative manufacturing processes, robotics, mechatronics, drones technologies, rapid prototyping and nanotechnology, 3D Printing and modelling technologies, Virtual Realities, Cloud and Cyberspace Technologies, Big data technologies, Biometric and other security related technologies (e-finger print and eye tracking Technologies), Climate Change/Resilient SMART Agricultural and Biotechnologies; Computer Numerically Controlled (CNC) manufacturing technologies, High Push/Pull Construction and Transportation technologies, Computerized Vehicle diagnosing and repairs technologies, Unmanned automatic vehicles speed regulating and crime detecting technologies among many others (Tapscott, 2009; and Stabback, 2016).

One would like to know what are some of the resounding themes and programmes in many of the TVET and Science Education programmes in developing countries and Nigeria in particular? How advanced is the technological advancement in TVET and Science Education in Nigeria? What are some of the limiting factors to these? What is stopping our graduate and even undergraduate project students from taking research topics in some of these rare and very critical areas? Instead we keep regurgitating project topics and over-flogging the already over researched content areas. Are these part of the global best practices? The answer is definitely, no.

Who are the 21st Century Digital Era Learners?

Studies (Gibbons, 2007; Tapscott, 2009; and Prensky, 2001) have shown that in most developed countries students who were born roughly between 1980 and 1994 (23 or 20 years and below) represent the first generation to grow up with this new technology and have been characterized by their familiarity and confidence with respect to Information and Communication Technologies (ICT/IT). They spent most of their lives surrounded by digital communication technology. They use the Internet, text messaging, and social networking, but primarily for social and entertainment purposes. According to Gibbons (2007) they communicate differently and use a different written language (e.g., text and instant messages), interact and socialize differently (e.g., via avatars in online games, Flickr and personal blogs), and of recent they are deeply into Facebook, WhatsApp, imo, Telegraph etc. In the late 1990s, based on the works of Tapscott (1998, 2009) and Prensky, (2001) social psychologists have indicated that people are categorized according to the digital literacy/usage era namely: "Digital Natives"; "Digital Immigrants"; or "Digital Aliens". The digital natives are those within the Net Generations and Generation X, whereas the digital immigrants may be those within the Baby Boomers generation. The digital aliens may be the silent generation – **The Born Before Computers (BBC) generation** (Palfrey, & Gasser, 2008).

The digital era is a time of incredible technological changes, which is synonymous to information or computer era. In the words of Rosen, (2004) cited in Gallardo-Echenique, Marqués-Molías, Bullen, and Strijbos (2015), this era can be divided into four distinct generations of which time holds a very different meaning for each of them. The generations also differ in learning styles. For instance, those born before 1946 (72 years old and above) make up the "***silent generation***." Next to that is the "***Baby Boomers generation"***, which is a generation of those born between 1946 and 1964 (between 53-74 years old). Following this is the "***Generation X"***, that is, a generation of those born between 1965-1980 who may be between 37-54 years old. The next is the "***Net Generation"***, which is the generation of those born after 1980 (from 37 years and below as at today). In all these four generations, each has different approach to technology and life which we may need to note.

The Silent Generation (born before 1946, 72 years old and above, the BBCs).

This category of people was raised without what we would call modern technology; they are more enmeshed in their profession if they have not yet retired. To them Technology is foreign and they have had to learn a whole new language and skill late in their careers. They defined themselves by their career and family often took a back seat to work.

The Baby Boomers (Digital Immigrants) - (Born Between 1946 – 1964; 53-74 years Old)

This category of people formed the first technological generation with computers on the horizon. They often have a single job throughout their working career, are fiercely loyal to their job, work to live and avoid making waves. Baby Boomers learned technology after their schooling and prefer face-to-face, process-oriented meetings. They like routines, and are auditory and visual learners. When Boomers get a new gadget their first step is to read the manual.

Generation X (Digital Natives) - (Born between 1965- 1980; 37-54 Years Old)
People of this generation were the first to be computer literate. They would hold multiple jobs with most working for up to 7 different companies. Because of their mobility they tend to challenge the authorities rather than simply follow company directives. Work is not the most important part of their lives and they value their personal time. They are results-oriented and since they grew up with technology, they prefer electronic communication. They like spontaneity, have little tolerance for time-intensive activities and feel strongly that long face-to-face meetings are a waste of time. They want their boss to give them a job and stand back and let them do their work. They are tactile learners. When they get a new gadget they just start hooking up wires and pressing buttons. To them reading product manuals are for "old folks." If you have Gen X clients, they may prefer to communicate technologically. They will want to see your web site before they have their initial session in your class/group. If you don't have one they may feel that you cannot possibly connect on their level. They will ask you immediately for your e-mail address and if encouraged at all will send e-mail messages between class sessions.

The Net Generation X (Digital Natives) - (Born 1980 and below; 37 Years old and below)
People of this Generation in most developed economies are those that have been entangled with technology from birth. They cut their teeth on computers, video games and the Internet. The average age that they started using a computer is 3 and most sent their first e-mail before they entered kindergarten. They live on instant messaging and communicate with friends more on instant messenger (IM), WhatsApp, Facebook etc. than any other way. They multi-task constantly with the average teen talking to 3 people at once on IM plus doing several other tasks at the same time. They get bored easily and change jobs and careers often. Just like the Gen X, the Net Generations are also tactile learners. They do just like Gen X when handed any new gadget. They do not like wasting time on reading manuals. Generally, the details in table 1 show the main differences between the 20th and 21st Century classrooms. (Gibbons, 2007); Palfrey, & Gasser, (2008) and Tapscot, (2009).

Makers and Cleaners of the Classroom
According a renown scholar Nicholas Murray Butler cited in Palfrey, & Gasser, (2008) and Tapscot, (2009, the World comprises of three kinds of people. A small group who make things happen, a larger group who watch things happen., and the great majority who do not even know what is happening. In the same way, in our classrooms today, these same categories of personalities exist who contribute in making or cleaning-off/unmaking what has been made by other leaders. Think of the Pencil Metaphor.

Table 1: Summary of the Pencil Metaphor

The lead(ers)	These people are the first to take on the technology, the early adopters who usually document and enthusiastically share what they have tried, warts and all.
The sharp ones	These are the people who see what the early adopters have done, willingly grab the best of it, learn from it the mistakes of others and do great stuff with their students.
The wood	These people would use the technology if someone would just give them the gear, set it up, train them and keep it running. All they need is help from some sharp persons and they would be doing it too.
The Erasers	These people endeavour to undo much, if not all of the work done by the leaders. They can be destructive if not identified, carefully managed and engaged in the classrooms.
The Ferules (hanger-on)	These people hang on tightly to what they know. They keep a strong grip on their traditional teaching practices and feel that there is not a place for the technology in their classroom
The dead wood	These are people who would not see any thing good in what technology is doing or being used for. They are afraid of it and would not like to be part of it no matter what. At best, you can change their thinking and purpose to do other basic tasks but not as originally intended. Avoid being a deadwood

Re-thinking Issues on TVET and Science Education Curriculum in Nigeria

Although in the past education generally and TVET in particular have been faced with a lot of challenges including those of image and stigma, but due to rapid technological advancements many developed countries are very much on top of these challenges (Majumdar, 2011). However, in the developing economies like Nigeria, this system of education still face elements of those challenges ranging from inadequate quality measures, to lack of development of the type of skills that can outlast the shifts in the world of work (Yalams, 2016a). To ensure that quality, access and purpose of TVET and indeed Science Education in the context of these shifts are met, there is the need to carefully re-evaluate and overhaul the entire education system in Nigeria, starting with the curriculum (Yalams, 2016b). The demand for high level skills due to transformative nature of job and requisite industry needs is resulting into high unemployment rate among TVET and Science Education graduates as alarmed by UNESCO–UNEVOC. The UNESCO–UNEVOC briefer video (n.d.) states that "every day more people worldwide gain access to basic education, and this has sparked career expectations and raised hope for better futures amongst many young people, yet, these hopes are not satisfied", and as such "there is high job insecurity, skills mismatched and growing youth unemployment". These challenges according to UNESCO-UNEVOC, are putting increasing pressure on education systems to provide relevant education for the world of work, and the unanswered question remains "how do we deal with these challenges?"

In order to deal with the impact of these changes, we need to understand the real areas where the challenges exist. Some of these, as summarised by Yalams, (2016c; 2019), include the shift of attention now from the 'teacher' who is usually in front of the classroom to the "learners" who are usually at the back of the classroom seated passively taking notes, thus, the 'learner-centered' concept. Also that, in formulating learning objectives and writing lesson plans, the focus has now changed from 'content-based' to 'performance or outcome-based. The advent of e- Learning has revolutionized education and pulled down many barriers to learning such barriers as distance, gender, access, and brick & mortar walls, and has created easy access via vast availability of learning devices such that, learning no longer depend on the use of Blackboards (BB), White Board (WB), but uses among others SMART Boards, or even 'No Board' (i.e. Screens of digital/mobile devices (such as Computers, Laptops, iPods, iPads, Tablets, Smart Phones, SMART TVs among others). Today, the assessment and evaluation of learning outcome/learner performance in TVET and Science Education have also changed in many developed countries from knowledge or content-based assessments to Authentic/Performance-based; also most examinations have changed from pencil-on-paper to Computer-Based Testing, which is just starting in Nigeria. The delivery is fast changing from "Time-based Education and Training (TBET) to Competency-Based Education and Training (CBET), and the method of certification are also changing to National or Regional Vocational Qualifications (NVQ), which creates the environment for recognition of prior learning, and seamless flow of the labour force across countries and regions, thereby boosting employment opportunities among teaming unemployed youth in those regions. The contemporary pedagogical approaches such as the Constructivist, Problem/Project-based Learning (PBL) and several other approaches are gradually replacing the 'traditional lecture' or 'chalk and talk' methodologies in modern classrooms across the globe. The question here is, where are the Nigerian TVET and Science Education systems in this continuum? Happy to note that, the NBTE has started implementing the National Skills Qualification Framework (NSQF) in the education system. The objectives of which include: To ensure the quality, status, relevance and availability of TVET provisions; Reduce the complexity and ambiguity of selecting a competent person to occupational positions by industry; provide training, assessment and certification opportunities for the formal, non-formal and informal TVET; establish pathways and progression from non-formal and informal short courses provided by various government agencies, NGOs and industry, to formal TVET programmes; narrow the gaps between what TVET graduates know and and can do and the skills and knowledge that employers say they need; and overcome limited progression possibilities and demand for TVET that far exceeds supply (NBTE, 2018). Therefore, what one expects to see also is the adoption of NSQF in all levels of TVET and Science Education from top to bottom. Or on a milder scale, let the curriculum of TVET and Science Education at all levels of education in Nigeria from Primary to tertiary be revised to inculcate the Competency-Based approach in their contents in order to move the country forward and make it more competitive in the global market. Still on the advances, we are also aware that, social media is now one of the platforms for learning than many physical classrooms. This is perhaps why Harcourt, (n.d.) in his work on Global Education Challenge indicated that, "our children receive more information on cell phone in their pockets than in the classroom". Virtual laboratories are gaining more popularity, and taking the place of physical laboratories or workshops in some academic disciplines, TVET and Science Education are gradually moving into that in other parts of the world. Today more open-education source materials are available than in the last 5-10 years. For instance, the Massive Open Online Courses (MOOCs) and the application of Learning Management Systems (LMS) is revolutionizing access to education. Today as I speak, I am a student of Open Education Resource University (OERU) studying a course on Open Education, Copyright and Open Licensing in a Digital world. This programme is provided free by EduBits Otagon Polytechnic, where various programmes leading to the award of transferable credits, certificates and academic diplomas or degrees are eventually obtained online courtesy OER

University. Also through the use of Cloud-Computing and Web-based learning systems, big data and quantum educational materials are deposited which help learners to access at their convenience far more than the traditional hard/printed copies. Thus, learners can complete their assignments, store them or send to their teachers virtually for grading without any physical or face-to-face contact with the teachers (Yalams, 2016b). The developments of digital learning Apps and Technologies, Soft or Virtual Instructional Packages and Computer/Web-based Software Applications for enhancing learning very much abound now than in the last five years. Thus we can now pride of having virtual or cloud-based electronic laboratories for almost all aspects of education. For TVET and Science Education product modelling and simulation of the real practical instructions are being done to supplement the scarce workshop resources for practical exercises, is this not advancement?. Medical surgery and other health services take place using electronic/virtual technologies in developed countries in this era. We are aware of such advances in medicine is gradually being tried in some hospitals in Africa, and Nigeria inclusive; this is indeed a welcome development. All these therefore, must send a message to us that, classroom teaching is not the only means through which students learn in this era, thus whatever we should do in TVET and Science Education, the curriculum and the instructional delivery must be sound and relevant to prepare our graduates for the competitive world of work. Again, the I ask, at what point of the ladder is our own TVET and Science Education in Nigeria, and what are the expectations and roles of the teachers in this transformation journey?

Teachers' Roles in Rethinking TVET and Science Education Curriculum in Nigeria in the 21st Century

In order for teachers in this era to be able to design a curriculum and deliver instruction in TVET and Science Education very effectively, we need to re-tool, or acquire additional skills and competencies. Palmer (2015) cited in Yalams (2016a, b, c & 2019) has enumerated 15 different characteristics of such skills which every 21st Century teacher should possess, and these include: Becoming a learner-centered teacher, a lifelong learner, determined people to learn the new learning technologies, one who thinks globally, and who possesses the ability to use Smart Digital devices, a teacher with the ability to collaborate effectively with others. Such a person should also be a potential user of, and taking advantage of the social media for educational purposes, one that has verse network of digital learning communities, an innovator and a PBL strategist. Additionally, according to Hampson, Patton and Shanks (2016) such a teacher should have the ability to think outside the classroom box, get personal, tap into students' digital expertise, get involved and be real with projects, expect (and help) students to be teachers, help (and expect) teachers to be students as well through life long learning. Someone who measures or assesses what matters most in his/her subject area, works with parents as well as their wards, and be a source of empowerment to the students among other things and not their source of sorrows. Additionally, the 21st Century teachers need to be critical thinkers, researchers and problem-solvers among others. The unanswered question still is, how many of the TVET and Science Education teachers here and out there, can boast of possessing 30-50% of these 21st Century teaching and learning competencies? The future of our children lies with the quality of their teachers and the ability to effectively facilitate learning for them for the 21st century workplace demands. Therefore, change should begin with us right here, and we must take this change agenda to the next level (Buhari, 2016), starting with the curriculum, but how do we do that?

Changing the TVET & Science Education Curriculum Through the Greening Concept

According to UNESCO-UNEVOC (2014), education as an industry which should pride itself in protecting the People, the Gains/Profits of the system, and the Planet (PPP). Thus, UNESCO-UNEVOC has advocated an approach for transforming TVET and by extension Science Education institutions globally from a non-sustainable (Red) into a more sustainable (Green) one. The Greening TVET (GTVET) is an emerging concept as part of fulfilment of UN's decade for Education for Sustainable Development (ESD), and now enshrined in the Sustainable Development Goals (SDGs). Majumdar (2010) describes GTVET as "a way of thinking in a sustainable manner as it relates to acquiring, consuming and disposing of utilities, proactive actions aimed at improving human well-being and social equity while significantly reducing environmental risks and ecological scarcities." The GTVET concept is aimed at transforming our schools/campuses, changing societal attitudes, land spaces, people's culture and lifestyles towards becoming more environmentally friendly. It focuses on positively changing the direction and emphasis of Technical, Vocational Education & Training. Within the GTVET framework, the emphasis is on waste management; renewable energy; environmental protection; community service programmes among others. The Framework for GTVET according to Majumdar, (2011) consists of five layers as follows:

Greening the Campus: This aspect is concerned with managing of the campus resources, technology deployment, environmental monitoring and others, so as to reduce the carbon footprint of such an institution, college or school as the case may be. Is your campus green? How exactly? Its not just about landscaping and beautification.

Greening the Curriculum: Refers to promoting sustainable development via the use of cleaner technology, defining green learning outcomes, integrating ESD across the curriculum, introducing teacher professional development among others in this direction. The expectation is that all TVET and indeed Science Education institutions should review their curricular to include elements of greening in them. Some have started; others are just doing something like that with out the knowledge of this. Where does your institution stand?

Greening the Research: This concerns, fostering research activities for instance on renewable energy, water treatment, green innovations, waste recycling etc. among faculties and departments of every institution at all levels of education. ATBU Bauchi and a few others can boast of these, but the level is still insignificant.

Greening the Community: Simply refers to adapting and impacting the wider community, especially those neighboring communities to the existing institutions via capacity-building, renewable technology adoption, resource support, unique practices and other means. In this case, the institution has a role to interface with the community to inculcate or interchange greening ideas or dimensions as the case may be. Is your community green? How exactly? It's not just about flowers and vegetation.

Greening the Culture: Refers to promoting the people's culture via inculcating green values, green attitudes, green ethics, green practices etc. into the communities. In all they do, let greening issues become part of the system. Green culture can take place through effective green community services. Greening TVET starts with reformation of the curriculum, therefore, the research agenda and the change of mind-set of the people. If the TVET system in Nigeria must be globally competitive, then the contents of its curriculum and its implementation must be sustainable to respond to the sustainable development goals (SDGs). Therefore, with this concept of TVET and Science Education in Nigeria, we expect to see reduction in waste of training materials, energy consumption, increase in recycling of waste, improved environmental sanitation, climate safe behaviours in all our endeavours, cleaned and safe environments, reduction in noise and air pollution, reduced carbon footprint in all our campuses among others. The teachers and other TVET and Science Education key stakeholders, have a task to get this started and going. Is your culture green? How exactly? It's not just about traditional dances and norms, but also about sustainable mind-set and transformed environment conscious habits.

Changing the TVET & Science Education Curriculum Through the STEM Integration Concept

The term "STEM" stands for Science, Technology, Engineering and Mathematics. Science as we all know, is the study of the natural world, which includes the laws of nature associated with physics, chemistry and biology. It is known as a body of knowledge that has been accumulated over time and a process that generates new knowledge (Reeves 2015). Technology on the other hand is considered as the art or craft of "modifying the natural world to meet the needs and wants of people" (ITEEA 2015). It is human innovation that involves the generation of knowledge and processes to develop systems to solve problems and extend human potential. Engineering as defined by the ITEEA (2015), is considered as the application of Mathematics and Science to create Technology. Engineering is about problem solving which uses the Engineering Design Process to create products or systems that would solve problems. Engineering is about designing, making, producing or building of structures, models, products, devices, processes and systems for the comfort, convenience and protection of humans (their needs and wants), in all sectors of life and the economy. Mathematics on the other hand is a language of numbers, operations, patterns and relationships. It is used in Science, Engineering and Technology to meet human needs and wants. Currently, the situation in the Nigerian TVET and Science Education curriculum and delivery system is such that, institutions teach each disciplines in 'Silos'. This approach does not help the 21st Century learners to think critically and devise sustainable solutions to existing problems as against integrating the disciplines and concepts consciously in the curriculum. An integrated STEM (iSTEM) education is a curriculum issue in which the delivery (teaching and learning) is done using the problem-based and constructivists approach. In this approach, Science, Technology, Engineering, and Mathematics concepts and disciplines are purposely integrated and delivered. When the arts or humanities disciplines are included, it forms the acronym 'STEAM'. In today's globalized world of inventions and innovations, STEM/STEAM education is needed in every aspect of the workforce for it to stay relevant and competitive. The importance of iSTEM education therefore in the TVET and Science Education curriculum needs not be overemphasized. For one, it helps build students' interest and deepens their understanding by making mathematics and science more relevant in what they are doing. Furthermore, it enables learners to respond to numerous problems facing humanity in a more realistic or authentic way. It encourages and promotes communication, collaboration, critical and creative thinking, invention and innovation through using the 21st century learning skills to solve problems. If our education system must be transformed, to be relevant and productive, our students be endowed with 21st Century skills, our country and industries be developed, and remain globally competitive, then we need to learn-how-to-learn and use the iSTEM methodology, develop in our learners the 21st Century Skills; use innovative teaching methods to develop in them real-world Project-Based Learning experiences and activities for sustainable national economic development. These I think we are not yet there.

Changing the TVET & Science Education Curriculum Through the Competency-Based Approach

In Nigeria, the National Board for Technical Education recently started the implementation of National Skills Qualifications Framework as part of TVET reformation process. This system employs the Competency-Based Education and Training (CBET) approach in which learners are trained and certified based on their attainment of competencies in any given career, skills clusters or tasks. Competency is defined by Wahab (2018) as the individual's ability to use, apply and demonstrate a group of related awareness, knowledge, skills and attitudes in order to perform tasks and duties successfully, which can be measured against well-accepted standards (levels) required in employment against provided evidences at work location. One's technical and/behavioural competency affects both his/her responsibility and performance on the job. The Competency-Based Education and Training curriculum wherever employed, aims at preparing learners more effectively for real workplaces, which means that the acquisition of competencies takes into account the requirements of companies and industry that are affected by globalization and the modern technology. Across the globe, the management of enterprises education institutions implement or deploy CBET with a view to having reasonable assurance of meeting their business objectives by assuring that their staff is well trained, assessed, verified and competent. The strategy of CBET in TVET and indeed Science Education is based around "Occupational competencies" which are established for each career field and for each job title. According to Wahab (2018), a Competency Based TVET System generally uses combinations of powerful techniques to ensure that the skills demands of different Industry sectors are addressed, courses or competency based training programmes are developed, competency based assessments/verifications are conducted, employees/apprentices/ trainees/students are efficiently trained and competent. The Competency-Based Learning (CBL) and Modules system are designed to enable the students to obtain the practical professional skills that meet the private sector demand, an approach which aims at teaching the students concrete skills rather than abstract learning (Stabback 2016). With this system, usually five or more levels of competencies (Level1 -semiskilled, Level2 –skilled, Level3 – craftsman, Level4 -technician and Level5 –expert is adopted by most countries.

In Nigeria, the two pathways for either academic or industry professional certifications are achieved through the following levels: NSQ Level 1- Pre-Vocational; JSS3; NVC 1 & Trade Test 3); Level 2 – NVC2 and Trade Test 2; Level 3 –NTC/NBC/NVC/Trade Test 1; Level 4 – ND/NID/ANTC/ANBC; Level5 –HND/Degree; Level 6 –Postgraduate. According NBTE (2018), the major sector skills already validated in the NSQF are: Building Construction with the following subsector skill areas: Plumbing, Masonry, Painting and Decoration, Tiling, Electrical Installation, Carpentry and Joinery, Welding and Fabrication. The Engineering has these subsectors: Automobile mechanic, Computer hardware maintenance and repairs, GSM repairs, Satellite installation and maintenance, Refrigeration and Air conditioning repairs and maintenance, tri-cycle assembly and maintenance, Motor cycle repairs and maintenance. The Hospitality, Leisure and Tourism has Hospitality and Catering, Travelling and Tourism; Power/Engineering has Power system protection, Turbine maintenance, Mechanical Auxiliaries' maintenance, system electrical operation, Electrical maintenance. The Servicing sector has Office technology, Leather works, Furniture making, Garment making Technology. The Agro-Processing has Rice milling validated. Right step in the right direction I would say.

Changing the TVET & Science Education Curriculum Through the PBL Concept

The Project-based/Problem-based learning (PBL) approach teaches students the collaborative and critical-thinking abilities they'll need to compete with in their places of work later in their chosen career. It is about time we rethink the delivery of TVET and Science Education from content-based to problem/project/scenario-based). For one reason, the PBL is an approach that develops creativity, innovation and critical thinking among learners. It is a systematic instructional delivery approach that engages students in learning essential knowledge and life-enhancing skills through an extended student-influenced enquiry structured around complex authentic questions and carefully designed products and tasks. Through this approach, students go through an extended process of inquiry in response to a complex situation, case, scenario, question, problem, or challenge. While allowing for some degree of students' "voice and choice," rigorous projects are carefully planned, managed, and assessed to help students learn key academic content, practice 21st Century skills such as: collaboration, communication & critical thinking, and create quality authentic products or solutions to some problems and make presentation to peers or wider campus communities (Palmer, (2015).

In the traditional classrooms, students typically work on simple assignments that emphasize short-term content memorization; they work alone, write for the teacher alone, and rarely make presentations. But with PBL, the learning is by contrast, deep, complex, rigorous, and integrated. With this approach, the Curriculum and instruction of TVET and Science Education are built around eight Learning Outcomes: Content standards, Collaboration, Critical thinking, Oral communication, Written communication, Career preparation, Citizenship and ethics, and Technology literacy which they embed in all projects, assessments, and grade reports. Instructors using the PBL start each unit by throwing students into a real-world or realistic project that engages interest and generates a list of things they need to know. Projects are designed to tackle complex problems requiring critical thinking. The school's strategy is this: In order for the students to learn collaboration, they are made to work in teams. In order to learn critical thinking, they take on complex problems and are tasked to handle. To learn oral communication, they are engaged in making presentations. To learn written communication, they are tasked to develop writing skills. To learn technology, they are pushed into using Information and Communication Technology (ICT). To develop citizenship, they take on civic and global issues. To learn about careers, they do internships. To learn content, they conduct research and do all of the above under teacher's facilitation or supervision.

Changing the TVET & Science Education Curriculum Through the Soft Skills or Competencies

The 21st Century Education system supports the development of hard and soft employability skills by the learners to prepare them for the contemporary workplace. In addition to the usual pedagogical and technological content knowledge, the other skills are what is referred to as the transversal competencies (3Cs, 4Cs, 6Cs etc.). What really are these soft skills or competencies, and how do they play out in moulding the learner behaviours in this generation? According to Brown, (2000) and UNESCO, (2016a), these competencies include:

Critical Thinking Skills – A deep cognitive action or process that helps one to filter, analyse, authenticate, process and synthesize information from a multitude of forms and a variety of media that will be useful in solving problems.

Communication Skills – Prepares the individual with the ability to present information that is clear, concise, effective and engaging in a way that is meaningful to the individual and the audience.
Collaboration Skills – Develops in the individual the capability to engage, partner and harmoniously work in a team, lead, assist, serve or associate with others with the intention to conduct business or execute a task that would benefit an individual or the whole public.
Creative Skills - Provide the learner with the capacity to create, produce, manufacture, develop, initiate, innovate, renovate etc. an event or something with the knowledge obtained for the purpose of benefitting an individual or the whole public.
Connectivity - Places the individual in touch with their world. In today's existence that is increasingly through the technology which is rapidly changing the way they view their world this skill becomes very critical.
Socio-Cultural Skills - Encourages the individual to appreciate where we have come from, who we are now and how we can move into the future. Culture associates the individual to all that surrounds them: art, drama, dance poetry, history, science, religion, written and unwritten language, technology and the individual themselves.
Innovative Skills – Develop into the individual the ability to be creative, entrepreneurial, resourcefulness, reflective in thinking, decision-making and application of his abilities and skills.
Interpersonal Skills – This has to do with communication skills, organizational skills, teamwork, collaboration, sociability, collegiality, empathy, compassion of the individual.
Intrapersonal Skills – Deals with self-discipline, ability to learn independently, flexibility and adaptability, self-awareness, perseverance, self-motivation, compassion, integrity, self
Global Citizenship Skills – Concerns personal awareness, tolerance, openness, responsibility, respect for diversity, ethical understanding, intercultural understanding, democratic participation, conflict resolution, respect for the environment, national identity, sense of belonging.
Media and Information Literacy – Is the ability to obtain and analyse information through ICTs, ability to critically evaluate information and media content, ethical use of ICTs
Physical and Psychological Health Skills – These have to deal with healthy lifestyle, healthy feeding, physical fitness, empathy, self respect, religious injunctions/rules among others.

As TVET and Science Educators, let us determine to ensure that our students leave the classrooms with the understanding that their future become bright and do not only lie on the hard skills but also on the mastery of these soft skills and competencies for the future education in Nigeria.

Conclusion

In conclusion, what we may need remember if we do not remember any thing else is that, a lot of changes have taken place and they continue to happen in this world. These changes have underlying implications to the viability and survival of TVET and Science Education in Nigeria, and the curriculum is the first point of correction. As 21st Century TVET and Science Education practitioners, if we must continue to be competitive and relevant in our chosen career globally, we have to imbibe some of these changes and devise means of addressing the accompanying challenges. We must therefore strive and ensure that our TVET and Science Education curriculum are reformed in line with the local and national industry needs. Our systems of education must produce graduates with the desired competencies that can make them competent and competitive in the global market. The reform in these areas should be done by employing various approaches and strategies, some of which include but not limited to the CBET, Integrated STEM/STEAM approach, Greening Education, the application of the PBL methodologies and inculcating the transversal competencies (soft skills) into the formal curriculum. In order to make our education system environmentally sustainable, there is the need for a culture change, and change in mind-set of our societies, institutions and communities. There is also the need for a curriculum re-engineering, and change in our research activities. Through this paper, we have been employed to inculcate the integrated STEM methodology in learning TVET and Science Education, so as to help prepare learners for problem-solving and developing creativity in them thereby equipping them with the requisites skills and competencies to become productive and competitive in the world of work in this competitive digital era. The old practice of training our young ones (the 21st Century learners) with 16th or 19th Century methodologies and competencies is a no-no, as it will not yield the desired results. No problems will ever be solved by the products of our education if problem-solving techniques and skills are not taught to the students or acquired by self-learning at all levels of education. The digital aliens (Born Before Computers BBC) should be encouraged to migrate with care into the digital countries and gradually nationalize. The digital immigrants should be encouraged to acculturate in their new aboard, and the digital natives (Generation X and Net generation should be encouraged to move higher to catch up with their counterparts in other parts of the world. Thus, all stakeholders are hereby called upon to ensure a reformed TVET and Science Education emerge in Nigeria. The People, Economy or Profit and the Environment/Planet are all very critical, integral and essential, as such, these must properly and securely be protected. As we conference, let us remember the theme, "Curriculum Issues in the 21st Century. Together we must carry TVET and Science Education in Nigeria to the next level of reformation. Thank you for your patience and for reading.

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ELECTRICAL/ELECTRONIC TECHNOLOGY EDUCATIONIMPLEMENTATION OF THE CURRICULUM CHALLENGES IN OYO STATE'S COLLEGE OF EDUCATION

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Abstract
The research design adopted for the study was descriptive survey using structured questionnaire to harvest views, opinions and information from the respondents through distributed Questionnaire Two research questions were raised for the study. The population for data collection was seventy five (75) respondents involving electrical/electronic lecturers/instructors from two Oyo State Colleges which includes Emmanuel Alayande College of education and Lanlate College of education, all in Oyo State Nigeria. Mean and Standard Deviation were used to analyze the data collected five points Likert scale of Strongly Agreed= 5, Agreed= 4, Disagreed=3, Strongly Disagreed=2 and Undecided=1 was used a decision of mean cutoff point of 2.50 above and below with Standard Deviation of 0.50 as Adequate and Not Adequate for the remarks using SPSS Version 21. It was recommend that the objectives of the curriculum should be strictly on skills development for the implementation needs of graduates after the completion of their academic pursuits. Also the content of the curriculum should lay more emphasis on electrical/electronic technology education's skills development in related to the field and society needs.

Key Words: Implementation, Curriculum, and Electrical/Electronic Technology Education

Introduction

Curriculum is the plan of all activities within the schools or colleges system intensive by either teachers or lecturers starting from the inception of the programme to the end in order to obtain or achieve the ultimate goals of the products or graduates. Curriculum however, are series of things which children and youths must do and experience by way of developing abilities to do the things well that make up affairs of life, and to be in all aspects what adults should be. Therefore curriculum can be viewed severally by different scholars, this among which Hass (1974) described curriculum as all the experiences that individual learners have in a programme of education whose purpose is to achieve broad goals and related specific objectives, which is planned in terms of a framework of theory and research or past and present professional practice. Curriculum as viewed by Anyanwu, Nzewi and Akaudolu (2004) is all learning experiences the reconstruction of knowledge for the cognitive, affective and psychomotor development of the learner.

In view of the above submission of curriculum definition, the learners learn within and outside the framework of the school activities and objectives of either the subject or the course outlines. Again according to Tanner and Tanner(1980) was of the view that curriculum is the planned and guided learning experiences and intended learning outcomes, formulated through the systematic reconstruction of knowledge and experience under the auspices of the school, for the learner's continuous and willful growth in personal-social competence. As such the elements of curriculum are objectives, content, method and evaluation according to Tyler

(1963) upon which each and every researcher are based their definitions for the learning outcomes of the graduates in any field of endeavour or chosen carrier which is of non-exceptional of electrical/electronic technology education. Objectives are the intended outcomes and ask the why, content which is what to teach and method describes how to teach. Therefore, Electrical/Electronic technology education which is a fractional part of technical education is an aspect of education according to United Nations Education Scientific and Cultural Organization (UNESCO) (2010). Again,(UNESCO) (2010) and National Commission for Colleges of Education (NCCE) (2012) describe technical education as the scientific study and the application of scientific methods to practical tasks in industries for production of materials, goods and services of humans resource. Technical Education is described by Federal Republic of Nigeria (FRN), (2013) that is an aspect of education which leads to the acquisition of practical and applied skills as well as basic scientific knowledge. In line with the views of UNESCO and NCCE minimum standard for certificate in Education, thereafter, any of the courses particularly electrical/electronic technology education which is the main focus of the research work required skills development with adequate supply modern infrastructural facilities such as tools equipment and machines in modern schools workshop apart of theoretical parts of the course. Also, Ezeji (2011) views technology education as a way of applying methods, tools, equipment, technical knowledge, machines and systems in the solution of human problems. However, this laudable objectives as part of the element of curriculum can not only be achieved through proper implementation by the implementers such as neither teachers, lecturers nor instructors as the case may be demand. The implementation is the instructions guiding the elements of the curriculum accorded to achieving the said goals of graduates through persistence of reviewing and assessing or evaluating the curriculum from time to time of the programmes at all levels of education for effective and improvement of needs. Evaluation provides information for particular decisions. According to Akinyemi (2013), evaluation is the processes of determining to what extent educational objectives are actually being realized by the programme of curriculum and instructions. It also helps in modifying or improving objectives, content and method. Based on this, it investigates on how far the learning experiences as developed and organized are actually producing the desired results and it involves identifying the strengths and weakness of the plan.

Statement of the Problem

Curriculum which is the heart of beat or plan for any of the programme of the schools activities within and outside school environment expected the learners to acquire for the attainment of goals seems not to be yielding positive results on the graduates of electrical/electronic technology education programmes as laid down by the curriculum of NCCE (2012) minimum standard for certificate in Education, expected the learners to be reliance, employer of labour yet many of these graduates are still seeking for white collar jobs in the society, the reasonbehind this might be that the curriculum content, objectives, methods and evaluate are not well articulated and implemented as laid down in the programme of electrical/electronic technology education and where such are fully implemented there might be the problems of inadequate modern infrastructural facilities coupled with incompetence of implementers to carry out proper implementation. These among others poised a question that needs to be answered by this research work in order to provide lasting solution to the problems.

The Purpose of the Study

The main purpose of the study is to determine theimplementation of the curriculum challenges on electrical/electronic technology education technology in Oyo State Colleges of Education towards 21st century for better performance. Specifically, the study determine:-

- ✓ Challenges in implementingthe electrical/electronic technology education in Oyo State Colleges of Education.
- ✓ Challenges in provision of modern infrastructural facilitiesfor the implementation of curriculumof electrical/electronic technology education in Oyo State Colleges of Education.

Research Questions: Two questions were formulated as followings:

- ❖ Do the curriculum objectives, content and method of implementation of electrical/electronic technology education in Oyo State Colleges of Education reflect the graduates' better performance?
- ❖ Are there adequate provisions of modern infrastructural facilitiesfor the curriculum implementation of electrical/electronic technology education in Oyo State Colleges of Education that require needful graduates' better performance?

Significance of the Study

The study will be of highly benefits to Educational planners, lecturers, students, Government and society. The educational planners will use the research work to review the curriculum and the implementation to effect the corrections where there are lapses for better performance in the future. Lecturers who aretheirresponsibilities are to implement theobjectives, content and method of electrical/electronic technology education would discover them and be able to adjust in trying to implementing the rightful skills and experience to students. The students who had acquired the skills and experience in the field of electrical/electronictechnology education would be useful to themselves in terms jobs creation, reliance innovation and host of others. Government would take due advantages to improve on their performance and provision of infrastructural facilities necessary for the willful growth electrical/electronic technology education and other aligning related courses for the studentsto stand on their owns after graduation. Finally societies which arethe beneficiaries of the products would have a relief of miscreants noted to be perpetrating evils in the society.

The Scope of the Study

The scope of the study covered two Oyo state Colleges of Education where electrical/electronic technology education are offered as course for the students.

Methodology

The research design adopted for the study was descriptive survey using 22 items structured questionnaire as instrument to harvest views, opinions and information from the respondents through distributed Questionnaire tagged: Implementation of thecurriculum challenges on Electrical/Electronic technology education in Oyo State Colleges of Education towards 21st century for better performance Questionnaire (ICCEETEQ).Two research questions were raised for the study. The population for data collection wasseventy five (75) respondentsinvolving electrical/electronic lecturers/instructors from two Oyo State Colleges which includes Emmanuel Alayande College of education and Lanlate College of education, all in Oyo State Nigeria are used for the study. There was no sampling technique used for the study because of the small size of population.The questionnaire was validated by three expects from Curriculum

Department, Faculty of Education, University of Lagos, Nigeria using face and content validity.Test, re-test was conducted twice at an interval of two weeks with 20 lecturers/instructors inIla College of Education, one of the Osun State Government college of Education as pilot study for consistency.

The data generated from the study were then analyzed using Spearman BrownFormulartool to obtain 0.70 reliability coefficients indicating that the study is appropriate and reliable for the study as it was above 0.60 of reliability index suggested by Ikponmwosa, (2006).Mean and Standard Deviation were used to analysis the data collected and obtained from the research questions on five pointsLikert scale of Strongly Agreed= 5, Agreed= 4, Disagreed=3, Strongly Disagreed=2 and Undecided=1 at a decision of meancutoff point of 2.50 above and below with Standard Deviation of 0.50 as Adequate and Not Adequate for the remarksusing SPSS Version 21.

Results Analysis

Research Question 1:-Do the curriculum objectives, content and method of implementation of electrical/electronic technology education in Oyo State Colleges of Education reflect the graduates for better performance?

Table 1: Mean ratings and Standard deviation response by lecturers/instructors on the curriculum objectives, content and method of the implementation of electrical/electronic technology education in Oyo State Colleges of Education as reflect on graduates for better performance.

SN	ITEM	X	SD	REMARKS
1	The objectives of the curriculum state clearly the skills that need to be acquired by the graduates of Electrical/Electronic technology education for better performance.	2.35	0.37	Not Adequate
2	The objectives of the curriculum reflect on the experience possessed by the graduates of electrical/electronic technology education for better performance.	2.55	0.55	Adequate
3	The objectives of the curriculum fall in line with electrical/electronic industries skill needs	2.40	0.43	Not Adequate
4	The objectives of the curriculum state clearly the practical skills more than theoretical to be acquired by the graduates of Electrical/Electronic technology education for better performance.	2.40	0.43	Not Adequate
5	The content of the curriculum are well established to reflect the skills acquired by the graduates of electrical/electronic technology education for better performance.	2.50	0.55	Adequate
6	The content of the curriculum are well established to reflect the experience possessed by the graduates of electrical/electronic technology education for better performance	2.55	0.57	Adequate
7	The content of the curriculum infused basic science and	2.60	0.58	Adequate

	elementary mathematics to be acquired by the electrical/ electronic technology education graduates			
8	The content of the curriculum fall in line with electrical/electronic industries skill required by the graduates	2.40	0.43	Not Adequate
9	The method adopted on the curriculum for the implementation of electrical/electronic technology education reflects on the graduates' skill for better performance.	2.60	0.58	Adequate
10	The method adopted on the curriculum for the implementation of electrical/electronic technology education reflects on the graduates experience acquired for better performance.	2.50	0.55	Adequate
11	The method adopted on the curriculum for the implementation of electrical/electronic technology education reflects on the graduates required by the industries.	2.35	0.37	Not Adequate

Key: X=Mean, SD=Standard Deviation, NR=Not Required and HR=Highly Required.

Table 1 shows that the highest to the lowest mean ratings with a corresponding standard deviationof Not Requiredrange from 2.35 to 2.40 and 0.37 to 0.43 indicating that items 1,3, 4, 8 and 11are not meeting up the three elements for curriculum implementation for the graduates of electrical/electronic technology education in Oyo State Colleges of Education of which it is expected to execute for better performance while items 2,5 ,6,7,9 and 10 mean ratings with a corresponding standard deviation range from 2.50 to 2.60and 0.55 to 0.58 indicating that, items 2,5, 6, 7,9 and 10 aspects of the element are well focused to bring the desired results for the graduates of electrical/electronic technology education as laid down by NCCE curriculum

- **Research Question 2:-**Are there adequate provisions of modern infrastructural facilities for the curriculum implementation of electrical/electronic technology education in Oyo State Colleges of Education required needful evaluation for better performance?

Table 2 Mean ratings and Standard deviation response by lecturers/instructors on the provisions of modern infrastructural facilitiesfor the curriculum implementation of electrical/electronic technology education in Oyo State Colleges of Education required needful evaluation for better performance

SN	ITEM	X	SD	REMARKS
12	There are provisions of modern school work for Electrical skills development	2.25	0.30	Not Adequate
13	There are provisions of modern school work for Electronic skills development	2.35	0.37	Not Adequate
14	There are provisions of modern tools for the implementation of skill required in electrical technology	2.40	0.43	Not Adequate
15	There are provisions of modern tools for the implementation of skill required in electronic technology	2.34	0.35	Not Adequate

16	There are provisions of modern equipment for the implementation of skill required in electrical	2.15	0.28	Not Adequate
17	There are provisions of modern equipment for the implementation of skill required in electronic	2.45	0.45	Not Adequate
18	There are provisions of modern machines for the implementation of skill required in electrical	2.25	0.30	Not Adequate
19	There are provisions of modern machines for the implementation of skill required in electronic	2.35	0.37	Not Adequate
20	There are adequate supplied of electricity for the use of skills development in the schools workshops	2.40	0.43	Not Adequate
21	There is provision of alternative power source such as standby generator for the use in school workshops	2.50	0.55	Adequate
22	The alternative power source are adequately fuel for use	2.15	0.28	Not Adequate

Key: X=Mean, SD= Standard Deviation

Table 2 of the above shows that all the items except item 21 mean ratingswith a corresponding standard deviation ranging from highestof 2.45 to 2.15 and 0.28 to 0.45 are not adequately infrastructural facilities provided for the training needs for the curriculum implementation of electrical/electronic technology education graduates in Oyo State Colleges of Education while item only 21 with mean ratingswith a corresponding standard deviationranging 2.50 and 0.55 was adequate in supplied for the training graduates of electrical/electronic technology education in Oyo State colleges of Education, Oyo State, Nigeria.

Discussion and findings

Table 1 submission of the research work outcome has revealed that the elements of the curriculum have not fully implemented by the implementers to give desire results expected of graduates of Electrical/Electronic technology Educationoutput as it is in line with Adeyemi (2013) and Tyler (1963) definitions of curriculum that really emphasized the four elements of curriculum. Again, Table 2 of the research study outcome revealed that there were no adequate infrastructural facilities as stated by items of the instrument for data collection indicating that inadequate of these infrastructural facilities hinder the success of the achievement of the curriculum as all these need to be provided before achievement can be made as state by NCCE (2012) minimum standard for certificate in Education and UNESCO (2010).

Conclusion

Since some of the problems facing the implementation of the curriculum have been identified as its applicable to Oyo State of Education used for research as a case study which may also likely affecting others Colleges of Education in Nigeria. Then the curriculum of technical Education most in particularly Electrical/Electronic Technology Education can be reformed and restructured to suit the needs of graduates to functions most especially at this period of economy recession.

Recommendations

The following recommendations were made with respect to the outcome of research work that:

- The objectives of the curriculum should be given equal attention on skills development as educational courses for the implementation needs of graduates after the completion of their academic pursuits apart from teaching.

- The content of the curriculum should lay emphasis on skills development in related to the field and society needs.
- The skills development and the application theory on electrical/electronic technology education should be given much more priority than education courses as it's on the present curriculum implementation.

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CURRICULUM INNOVATION IN MATHEMATICS: A REMEDY TO CONTEMPORARY ISSUES IN SCIENCE AND TECHNOLOGY EDUCATION

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Abstract:
Mathematics as base for science, technology and other disciplines, indeed plays a vital role on human capacity development. It is perhaps a most applicable subject on solving real life problems, but yet the learners often find the subject difficult not because it is naturally difficult but maybe because of those innovative factors of existing curriculum that limited the incorporation of some creative ideas that would have made the learning easier and the learning outcome more responsive to the life realities. The present world seems to be moving digitally. While many of our present day's educationist keep moving in an analog way not because they lack knowledge in their various subject areas but due to those contemporary issues in science and technology education that need to be addressed. This paper therefore, aims at highlighting the concepts of mathematics in relation to curriculum innovation as well as those contemporary issues in science and technology education. The paper further recommend among the other things that, the interdisciplinary teacher education should be upgraded to meet up with the aspiration of the 21st century

Keywords: Mathematics, curriculum innovation, contemporary issues, science and technology education.

Introduction

Developmental status of taking any nation is perhaps dependent on the status of its science and technology design, effective mathematic instruction as well as responsive curriculum design and implementation since the issue mentioned above are either directly or indirectly interdependent, why? This is because there can be no development without technology, no technology without mathematics and no mathematics without proper curriculum design, hence, curriculum and teaching in the field of education are just positive and negative wire on electric supply while it was observed that, no education system can rise above the quality it teachers (FME, 2004) science in the United stated is widely credited as a major source of discovery and economic development, as reported by the Teachers Assessment Programme TAP, 2005, Produced by a prominent group of cooperate leaders, states that to maintain our century's competitiveness in the 21st century, we most cultivate the skilled scientist and engineers needed to create tomorrow's innovations. Supporting the statement was the panel of scientist, engineers, educators and policy mercers who concerned at the National Research Council (NRC, 2007). They reported that, "the validity of the nation is derived in large part from the productivity of well trained people and the steady stream of scientific and" technological innovations they produced.

The Concept of Mathematics

Traditionally, Mathematics is defined as the scientific study of quantity operations and measurements expressed by numbers and symbols. In Mathematics dictionary by **James & James,** it has been defined as the "science o f logical study of numbers. Shapes, arrangements, measure and many related concepts". Although, it's usually described as a science that investigates abstract structures that is created itself for their properties and patterns. According to **Wikippedia**, Mathematics is the "study of quantity, structures and space. Mathematics seeks out patterns and used them to formulate new conjectures. According to Aristotle, Mathematics is defined as the science of quantity"? **Benjamin pierce**, defined Mathematics as the "science that draws necessary conclusion". **Marcus du Sautoy**, sees Mathematics as the "queen of science",.,,,, the main driving force behind scientific discovery, Although almost all great mathematicians stated something for it, yet there is no generally accepted definition that could be produced. While a little attempt has been made in this paper to define in single sentence and exact form which will significantly accepted without any counter example.

1. **Quantity and quality of teachers:** according to Ubandoma, (2006) and Danmole, (2011) found that lack of trained teachers in schools militate against implementation of basic science curriculum in school while, According to UBEC, (2008) reported that Qualified and motivated teachers were lacking in the school. According to National Policy on Education (EME,2004) teachers is the most important factor in curriculum delivery since he is responsible for translating the curriculum objectives into reality with his interaction with students and their programme. It further states that, the level of achievement in the implementation of any education. Curriculum depends on the quality of its teachers as no education system can rise above the quality of its teachers. Even if all facilities are provided in the schools and the teachers are not qualified and educated, the aims and objectives the curriculums are defeated. This is because teachers are the translators of educational policies into action AFE. NWOSU and Ibe, (2012).

2. **Instructional Practice:** it was found that, common practices in the class rooms, shows that even through the learners and schools environment are changing, and the teacher's instructional strategies remain the same. It implies that opportunities with abound with innovations in instructional strategies such as communication technology compliance which may help to facilities curriculum delivery in the classrooms are not being utilized. Davis and Sorrell in Abakpa, (2011). The new mathematical curriculum designed a lot of activities for the learners to practice which changes the role of the teachers to that of facilitators. The ability of some teachers to change to modern instructional strategies exposes a serious threat to achievement of curriculum objectives. It was further reiterates by MDG that the instructional practice employed by teachers may be inimical to the achievements. Most teachers are as ordinary as they were by their own whom most often used the traditional teaching approach. The approach which some teachers have not been able to divorce themselves from is described to be teacher centered and hardly meets students' needs. Hence, it is counterproductive to the dream of 21st century.

3. **Instructional Materials:** developing the learners' entrepreneurial skills is part of the major expectations of the MDG that will enable them to functions the particular society they live. The teaching of mathematics is to meet up with these goals requires all round development of the child. According to Okeke, (2012) Teaching is to develop the cognitive, psycho motive as well as affective skills. This involved material resources which are need to inculcate practical skills in learners and making teaching an activity centered exercise. These materials that can be manipulated, seen, read and talk about instruments which facilitates such activities (Okeke in Nwagbo & Ukaegbe, 2012), Chime, (2011) however, opined that

resource materials aids the teachers to teach more effectively. It also helps to stimulate students' interest and retention of learning task. According to Old Confucius saying in Ajeyalemi, (2011, p4) "hear and I forget, I see, I remember, I do and I understand". This implies that when students are exposed to learning by manipulating appropriate instructional during instruction they understand the learning basis better and find it easier for application.

4. **Physical Infrastructure:** the schools learning environment also plays a vital role and impede a chance for effective delivery of mathematics curriculum the physical infrastructures of schools have been reported severally as a major constraint for effective curriculum delivery and implementation in schools at serious stage of teaching and learning situation in Nigeria (UBEC, 2007). It has been further observed by United State Agency for International Development (USAID,2003), that some schools operated under trees, while harsh learning environment and decay infrastructure. Lack of these basic infrastructures resulted to overcrowded classrooms. Some schools were operating under blown off roots, inadequate seating and other instructional materials resulting t serious large class size in which according to International Labor Organization (ILO) and the United Nation Educations Scientific and Cultural Organization (UNESCO) should not exceed 1:3, 1:35 teacher/pupils for primary and secondary schools respectively.

5. **Regular Urban Migration:** there has been a drastic difference between the provision of basic social amenities and opportunities available in urban and rural schools. Teachers who were posted to rural schools usually worked out reposting to more socially friendly ones because they found life much miserable over there, henceforth, such rural schools cannot meet their social aspiration Mulemwa, (2006). Mulemwa further reported that, distribution of instructional materials such as textbooks; registers, curriculum, mathematical kits and computers are more favorable in urban located schools than that of rural areas. In Nigeria lack of constant power supply, good source of drinking water and bad roads network are among the other factors that affect availability of qualified mathematics teachers in many schools.

6. **Monitoring and Supervision:** the way that many schools in Nigeria are might be led to variation in delivery of the mathematics curriculum. It is run in private and public secondary schools as Junior Secondary Schools, the stakeholders in charges of monitoring and supervision of the schools such as teachers service board (TSB) at the state level or the local Government Education Authority (LGEA'S) are concerned with the responsibilities of monitoring and discipline the teaching staffs of their various schools, recruitment of teachers and provision of instructional materials.

Objectives of the Basic Science and Technology Curriculum

The overall objectives of the new basic science and technology curriculum outlined by Adeniyi, (2007) are to enable the learners to:

i. Develop interest in science and technology
ii. Acquire basic skills in science and technology
iii. Apply their scientific and technological knowledge and skills to meet societal needs,
iv. Take advantage of the numerous career opportunities offered by science and technology; and

v. Become prepared for further studies in science and technology.

In order to achieve a holistic presentation of science and technology contents to learners for sustainable national development, the thematic approach to content organization should be adopted. The four themes should cover knowledge, skills and attitudinal requirements. These are: You and Environment, Living and Non-living Things, You and Technology, and You and Energy.

These themes will expose pupils to developments in science and technology alongside skills that will enable them to face challenges, make informed decisions, develop survival strategies, and learn to live effectively within the global communities. The new UBE basic science and technology curriculum is carefully planned, well written and documented having all it entails to bring about socio-economic development.

Strategies use of Science and Technology in Teaching Mathematics
This is indeed the portion of the National Council of Teacher of Mathematics. In order to come up with an answer to some questions like:
What is the role of Technology in the teaching and learning of Mathematics?

It is important that teachers and students have regular access o technologies support and adequacy mathematical sense making, reasoning, problem solving techniques and communication. However, effective teachers optimize the potentials of technology to logically develop students understanding, stimulate the interest and increase the proficiency in mathematics as well, once teachers used technology strategically, they can provide greater access to mathematics to all students.

The technological tools include those that are both content specific and content neutral. In mathematics education, content specific technologies include: computer algebra system, dynamic geometry environments, inter active applets, handled computation, data collection and analysis devices, as well as computer-based application. These technologies support students in exploring and identifying mathematical concepts and relationships.

The Content Neutral Technologies includes:
Communication tools and web-based digital media and these technologies increase students' access to information, ideas and interactions that can support and enhance sense of making which is central to the process of taking ownership of mathematical knowledge. Mathematical proficiency such as problem solving, reasoning and justifying (e.g Gadenidis and Geige, 2010), (Kastberg and Leathum, 2005) Nelson, Christopher, & Mims, 2009), piece & Stucey 2010), Rostopher, & et al, 2009, 2010, such & Moyer, 2007) in a balanced mathematics program, the strategic use of technology strengthen mathematics teaching and learning (Dic & Itollerands, 2011). Simply haven access to technologies is not sufficient. The teacher curriculum plays a vital role in mediating the use of technological tools (King-sears, 2009, Roschelle, et al, 2010, Such, 2010). Teachers and curriculum must be knowledgeable, decision makers, skilled in determining when and how technology can enhance students learning appropriately and effectively. (ISTE,2008). In addition, to enhancing students experience as learners of mathematics, use of these tools maximizes the possibilities afforded by students, increase

knowledge about and comfort with technology driven means of communication and information retrieval (Gadanidis & Geiger, 2010, Project Tomorrow, 2011).

Benefit of Using of Technology in Mathematics

a. Connect concept to the real world
b. It gives ability to expand and enrich our mathematics and STEM instruction
c. On-demand and personalized learning experiences
d. Interactive visualizations and exploration and
e. Multimedia

Conclusion

The fact has been established that the socio-economic status of any nation is determined by its technological accomplishment, perhaps, when technology is used in the field of mathematics education, there is strong tendency of producing mathematicians that are responsive to the school needs of the 21st century, it can be best achieved by ensuring unclaimed innovation in mathematics curriculum.

Recommendation

- Used of technology in teaching mathematics need to be given more priority.
- Mathematics teachers should be given regular training by the relevant authority in order to have an updated knowledge of mathematics for successful delivery
- The issue of excess workload on mathematics teachers need to be check by the concerned authority.
- The issues of basic amenities in the rural schools need to be addressed so as to give the schools equal opportunity in mathematics education.

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CURRICULUM ISSUES IN BIOLOGY EDUCATION AND FOOD SECURITY IN NIGERIA IN 21st CENTURY.

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Abstract
The job of Teaching and learning any subject is in the proper designing, implementing and reviewimg of the subject's curriculum. The study used secondary data to asses various issues and challenges in biology education curriculum in 21s century in Nigeria and food security. The paper indicated that some of the issues in curriculum of biology education affecting food security in Nigeria includes: ineffective reviewing of biology education's curriculum, insufficient curriculum experts in biology education ,political instability and the present security challenges in Nigeria. The paper recommended that capacity building should be organized for the biology teachers to update and upgrade their professional skills, including attitude for effective and functional review of biology education curriculum to ensure food security in Nigeria through inclusion of more practical methods of food production like grafting, layering, stem cutting, also well-equipped and functional school laboratories, gardens should be established in schools and above all the government should reduce the security challenges to the bearest minimum.

KEYWORDS: Curriculum Issues, Biology, Education and food security.

INTRODUCTION

The continuous search by humans for food security is not a new phenomenon, many nations (Nigeria inclusive) apply different educational methods and approaches to ensure food security for their citizens. This is done by constantly upgrading and reviewing of curriculum of concerned subjects that has any link with ensuring food production, processing, packaging, storage and security.

This is done so as to ensure that not only the present but equally future generations are secured in terms of food. Various researches, seminars and workshops are dedicated to finding and ensuring that humans discover new methods of producing high yielding varieties of different food crops in shorter germinating, maturing and harvesting periods.

Concept of curriculum

The definition of curriculum has continued to change over time this is because it has been defined by various scholars in different ways. Kerr(1968), defined curriculum as all the learning which is planned or guided by the school whether it is carried on in group or individually inside or outside the school. To Wheeler(1967),it is the planned experiences, offered to one learner under the guidance of a school. Stenhouse (1975), further defined it as a course especially a regular course of study at a school or university .Nduanya(1986),further maintained that curriculum is the total of all the learning experiences the school envisages for leaner under its guidance.

The Hong Kong year book,(2006), noted curriculum as syllabus which could achieve the objective of motivating the learning, enhancing knowledge and abilities and developing positive values or even attitudes. To Goodson,(1994),curriculum is a multifaceted concept, constructed, negotiated and renegotiated at a variety of levels and in a variety of arenas. Yet to Beauchamp,(1977),Wood and Davis(1978) curriculum is a process of selecting courses of study or content. Similarly, Pratt(1994) conceives is as a plan for a sustained process of teaching and learning with a specific focus on content and the process of teaching and learning.

Brady,(1995),views curriculum as a document-an outline of a course program that is written on a piece of paper. Barrow and Milburn,(1990),opined that curriculum is the official written programs of study published by ministries or departments of education, local authorities and team of educational specialists working on specially funded projects.

From all the above definitions, curriculum can be seen as the selected, integrative, evaluative and innovative experiences given to the learner either consciously or unconsciously under the direction of a school. It is all that is planned to enable the students acquire and develop the desired knowledge, skills and attitudes desired and needed by the society. Curriculum is a plan for educating youths this plan is laid down so that a definite route to be taken by the process of education is chartered. The job of Teaching and learning any subject is in the proper designing, implementing and reviewing of the subject's curriculum. This clearly makes it necessary for curriculum to be of much importance in teaching and learning of various subjects globally.

It should be noted that Curriculum as plan or tool needs to be updated, upgraded and reviewed from time to time and to adjust to realities of any time and situation. This is done so that societal problems could be solved to a large extent.

As societal problems are taking new dimensions and equally becoming more complex, this has made it necessary for curriculum to be reviewed and upgraded so as to solve or reduce these changing problems.

Concept of Biology Education

Biology education is a branch of science education that deals or involves the study of living things and human beings inclusive. According to Ramalingam, (2007), biology education involves the study of living phenomena by observation using scientific methods to unravel the mysteries of life .Davies, Rieper and Tuszynski (2013) opined that biology education is a study of the natural science that studies life and living organisms, including their physical structure, chemical processes, molecular interactions, physiological mechanisms, development and evolution. On a similar note, oxford advanced learners dictionary 6th edition, viewed biology as a scientific study of the life and structure of plants and animals. It is the study of the way in which the body and cells of living things behave.

Biology being a science of life (Anglo and Silas,1986),plays a very crucial role in the life of every citizen in Nigeria. Aina, (2013),stated that, biology education is important to any growing economy like Nigeria, this is because biology has been made central focus in some human activities including being a solution to the problem of food security, health, hygiene, family life, poverty reduction, management and conservation of natural resources and biotechnology. There are numerous ways individuals derive benefits from the knowledge of biology education, these includes:

- Biology education helps an individual understand himself, part of his body and its functions.
- Help individual to be aware of the need to maintain good health such as eating adequate food, clean water, good sanitation e.t.c.

- To prepare individual for vocational selection such as medicine, dentistry, agriculture and so forth.

- Help to impact factual knowledge and stimulate scientific reflective thinking so as to produce a better informed individual Nuhu,(2003).

Against this background, biology education as an aspect of natural science can be used in understanding, explanation and solving many issues related to human life in our society (Nigeria inclusive). Biology education is designed ultimately to give a strong foundation for Nigerian students especially in this 21st century when Nigeria's population is on an all high rise and food availability and security is becoming a threat. The knowledge of biology education has made great contribution to the individual and entire world in the area of food production, this has been seen in applied biology through which improved varieties of agricultural products are introduced, farmers yields in crops are now assured through many ways which includes identification of soil structure and texture. There is thus every need to review and upgrade the curriculum of biology education in Nigeria in this 21st century.

Concept of Food Security
Food security is a measure of the availability of food and individuals' accessibility to it, where accessibility includes affordability. There is evidence of food security being a concern over 10,000 years ago, with central authorities in ancient China and ancient Egypt being known to release food from storage in times of famine. The world food conference 1974 defined food security with an emphasis on supply, "food security they said is the availability at all times of adequate, nourishing, diverse, balanced and moderate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to fluctuations in production and prices.
The FAO defined food security as a situation that exists when people have secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life.

According to the final report of the 1996 world food summit states that ''food security exists when all people at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life". From these definitions, the Food and Agriculture Organization (FAO) of the United Nations identified the four(4) pillars of food security which are; food availability, access to food, utilization and stability. Food security incorporates a measure of resilience to future disruption or unavailability of critical food supply due to various risk factors such as droughts, economic and political instability and wars. The united Nations recognized the right to food in the declaration of human rights in 1948, and has since noted that it is vital for the enjoyment of all other rights. The world summit on food security (1996) ,declared that ''food should not be used as an instrument for political and economic pressure.

Curriculum Issues In Biology Education And Food Security In Nigeria In 21st Century.

The educational needs and aspirations of Nigerians towards food security is on the increase especially in this 21st century. These needs arose from changes occurring in all dimensions of our society (geometric increase of Nigeria's population included).

Danjuma (2013) cited in Nuhu(2010) opined that changes in Nigeria's societal needs have created a demand for a more technically and practically type of biology education for both teachers and pupils in Nigeria. They require technical and practical level of teaching and training in biology education, since education is continuous so also is the need for immediate review and upgrade curriculum of biology education is increasing and continuous.

A large number of topics in biology that are presently being taught in Nigeria's schools need to be reviewed and upgraded for these are topics that have being taught exactly same way and method for over twenty(20) years when the country's population and hence food demand was not as high as the present day. The proper education in biology for food security in Nigeria in this 21st century could be achieved through a well developed, reviewed, planned and implemented curriculum in biology education. The present curriculum of biology education in Nigeria is besieged with a lot of issues that is hindering the proper teaching and learning of biology so as to ensure food security for the ever increasing population of Nigeria. Among the curriculum issues in biology education hindering food security in this century in Nigeria includes:

- Outdating: The present curriculum of biology education in Nigeria is not realistic to the needs of the present times in Nigeria, this is because it was developed based on the then challenges facing Nigeria which are quite different from the present ones facing Nigeria in the 21st century.

- Insufficient funds: This is by and large one major issue with the curriculum of biology education in Nigeria, if the curriculum is to be reviewed and upgraded to meet the challenges of the present day then it must be adequately funded by the government of the country. Reviewing of curriculum needs a huge amount of funding which the relevant authorities are not willing to allocate and hence the continued outdating of biology education in Nigeria and the rise in food insecurity.

- No timely reviewing and upgrading of curriculum: curriculum of biology education in Nigeria has not been reviewed and upgraded to meet the present challenges of Nigeria and unless this is done, the biology education that will be taught will remain outdated and not realistic.

- Non-involvement of biology education experts in curriculum activities in Nigeria: Nigeria is a country where the right or qualified personnel for a particular job are hardly employed. Thus, many people involved in curriculum activities are not experts in the subjects concerned. This goes a long way to affect the curriculum of many subjects and hence in the end many subjects curriculum (biology education inclusive) fail to meet the desired objectives.

- Government attitude and support: Educators ,professionals and others can't do much on curriculum review and updating without the support and help from the government. In essence the government has a non-challant attitude towards education and hence curriculum review and update in Nigeria. And this negative attitude of the government towards education in general is a major issue in the curriculum of biology education in Nigeria in this 21st century.

- Security challenges in Nigeria: The present security challenges facing Nigeria is another major obstacle in the curriculum of biology education , this is because insecurity of life and property is high and on the increase from bokoharam, niger deltavengers, herdsmen/farmers clashes, armed robbery hired assassins to kidnapping. Many educators ,professors met their untimely, painful and sad end to this menace. So even if all funds and curriculum experts in biology are available or put in place the question is where is the secured place in Nigeria for them to properly review and upgrade the curriculum?

- Political Instability: Another major issue with the curriculum of biology education in Nigeria in this 21st century is that of political instability. Each successive government has a different agenda from it's preceding one such that before any government completes its programs and agendas its already out of power. So with an outdated curriculum and an unstable government the problems of the biology education curriculum became more complex and thus its not able to meet its objective, nor reviewed to face and solve the present challenges facing the nation of which food security is inclusive.

- More emphasis on praticals than theories: Biology is a science subject which needs more practicals than theories, many institutions teaching biology lack well equipped and up-to-date laboratory and its needed facilities to conduct practicals needed to solve present issues in Nigeria which includes food security. Different plants propagative methods that can lead to shorter or earliest harvesting periods needs to be practically taught to students to enable them venture on their own to boost the ever increasing demand for food , but the fields, biological gardens and laboratory to practicalize all these skills are unavailable thus making biology education curriculum to be more of classroom activity than laboratory and practical field experience.

Conclusion

It is concluded that the search for food security by Nigeria and for its citizens is not a new one and cannot be overemphasized most especially in this 21st century as Nigeria is equally the most populated African country on earth.

Realizing the role, contribution and importance of biology education on food security in Nigeria, the government needs to actually take the bull by the horn by ensuring that curriculum of biology education is as effective and practical as possible and thus ensure that all issues with the subjects curriculum are solved.

The present curriculum of biology education in Nigeria is posed with a lot of issues or problems that are making the search, desire and objective of attaining food security in Nigeria in this 21st century an impossible task , more so, as biology education is one of the surest subjects and methods that with a proper and hitch free curriculum can provide Nigeria with food security in this 21st century.

Recommendations

Considering the above curriculum issues in biology education today in Nigeria, the following recommendations or solutions can go a long way to reduce or solve these problems;

Capacity building workshops and seminars for biology teachers so that they improve on their skills and be at level with what is obtainable in other developed countries. Immediate, effective and functional review and upgrading of curriculum of biology education (inclusion of more practical methods of food production like grafting, budding e.t.c.) to meet the present food security challenge of Nigeria.

- Government should give its total support for the review of curriculum in biology education to increase the chances of Nigeria to become a food secured nation.
- Involving experts in biology education in the review of its curriculum as it will go along way in ensuring that topics that would be taught will be relevant for solving present and future challenges of the country.
- Government should increase its efforts to make Nigeria a safe or secured country as without security of life little can be done to improve on the curriculum and other issues.
- Government should provide well equipped and functional laboratories and gardens for institutions teaching biology.

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THE INFLUENCE OF SCHOOL-LOCATION, SCHOOL-SIZE, GENDER-DIFFERENCE AND TEACHER-VARIABLE ON THE PERFORMANCE OF SECONDARY SCHOOL STUDENTS IN GOMBE STATE.

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Abstract
The paper considered the influence of school-location, school-size, gender-difference and teacher-variable. A total of one thousand one hundred and twenty (1120) SSCE results were used from twelve (12) schools in eight Local Government Areas in Gombe State. Data collected were analysed using t-test and Analysis of Variance (ANOVA) to test the four (4) postulated hypothesis of the study at 0.05 alpha level of significant. Results show that there is significant influence of each of school-location, school-size and gender-difference and there is no significance influence of teacher-variable on the performance of secondary school students in Mathematics, based on the results of the study recommendations were given to improve the teaching and learning in secondary schools so as to meet the 2030 millennium goals.

INTRODUCTION
Mathematics consists of activities such as formulation of concepts, abstraction, generalization, theorem building, problem solving etc. Whichare needed in the study of Science, Engineering, Economics, Medicine andother fields of study (Abiodun, 2007). Furthermore, Adeyegbe (2005), said there is hardly any area of science that does not make use of Mathematics.

Mathematics is the bedrock that provides springboard for scientific andtechnological developments that leads to modern society. This implies thatMathematics as a subject must be properly taught in secondary schools toobtain interest; understanding and good performance that in turn will yieldand boost the technological development of the country.

Background of the Study
However, Mathematics education is currently in a crisis state asevidenced in the result of secondary school students in external examinationsuch as WAEC, NECO and UTME. This is supported by the results ofstudents in WASSCE from 2002 to 2012.

Table 1
SSCE MAY/JUNE performance of student's in mathematic in Nigeria at credit level and above, 2002-2012.

S/N	YEAR	% AT CREDIT LEVEL
1	2002	37
2	2003	35
3	2004	19
4	2005	34
5	2006	38
6	2007	21

7	2008	17
8	2009	27
9	2010	47
10	2011	25
11	2012	20

Source: West African Examination Certificate (2013)
From the above table, it could be seem that the performance ofsecondary School students in mathematics from 2002 to 2012 is nothing to write home about Lawal, Abiodun, and Joju (2008) found the role ofteachers in implementing national policy of education as inadequate andthis implies that there is no solid foundation in mathematics for Nigerianstudents at any level of education. Yet Ekuweme (2006) discover that numerous problems best mathematics teaching and learning which haveresulted in this poor performance. These problems include school-size, school-location, gender-difference of students and teachers variables whichare the factors that motivate the researchers of this study which is the aimand objectives of finding solutions to these students' poor performance inMathematics.

Statement of the Problem

The poor performance of secondary school students in Mathematics isincreasing and a great concern to the government, parents and stakeholdersin education. Many factors have been considered as causing this poorperformance which includes home background, lack of Mathematics teachers, teachers method of teaching, parental behaviours, problem of related textbook and a host of them. However, the focus of this study is therefore tofind out the influence of school-location, school-size, gender-differences andteacher variables in terms of qualification and teaching experience on theperformance of secondary school students in mathematics. The influence ofeach of these variables will be determined by the study on the performanceof secondary school students in Mathematics using some randomly selected schools in Gombe state.

Purpose of the Study

The study will be conducted to find the influence of school-size,school-location, gender-difference of students and teacher variables on theacademic performance of secondary school students in Mathematics.However, the specific objectives of this study include:

1. To determine the influence of each of the variables on the performanceof secondary school students in Mathematics.

2. To find what difference exist between the performance of students from large-size and small-size classes.

3. To determine whether there is any significant difference between theperformance of students from urban and rural areas.

4. To compare and contrast the performances of male and female studentsin mathematics.

5. To find how the teacher-variables (experience, qualification) haveinfluence their performance in Mathematics.

Research Questions

The following research questions are postulated to sharpen the focusof the investigation

1. What is the influence of school location on the performance ofsecondary school students in Mathematics?

2. Does school-size has any significant influence on the performanceof secondary school students in Mathematics?

3. Is gender-difference has any influence on the performance ofsecondary school students in Mathematics?

4. Do the teacher variables (i.e. academic qualification and years ofteaching experience) have any significant influence on theperformance of secondary school students in Mathematics?

5. Is there any significant difference between the performance of thesecondary school students from urban and rural areas in Mathematics?

Research Hypotheses

In order to guide the study appropriately, the following nullhypotheses will be formulated to be tested 0.05 alpha level ofsignificant.

1. There is no significant influence of school-location on theperformance of secondary school students in Mathematics
2. There is no significant influence of school-size on the performance ofsecondary school students in Mathematics.
3. There is no significant influence of gender-difference on theperformance of secondary school students in Mathematics?
4. There is no significance influence of teacher variables on theacademic performance of secondary school students in Mathematics?

Significance of the Study

The findings of this study would be beneficial to students, teachers, parents, government and society. The study will help the students to putmore effort in the learning of mathematics so as to improve theirperformance in both internal and external examinations.

The study will help teachers to plan their lessons to meet thedifferences in students in terms of gender, class size, school location andgain their attention properly towards learning.

The parents through the study will be encouraged to provide all thebasic requirement needed such as text books mathematical set and othersthat will motivate their children/ward.From the study government will be able to recruit more qualifiedmathematics teachers to teach in both rural and urban areas to meet the gabof lack of mathematics teachers in secondary schools.

The society where the schools are located will be geared to give thenecessary assistance and support to these schools so as to encourage and about conducive learning environment for teaching and learningmathematics.

Scope and Delimitation of the Study

The research only put the influence of school-location, school-size,gender-difference, and teacher variables among other factors influencing theperformance of secondary students only using one thousand one hundred and twenty (1120) students from randomly and purposely selected from the state andscores of students in senior school certificate examination for the periodunder consideration will be used mathematics. Mathematics was consideredbecause it is a core subject in secondary school SSS 3 students wererandomly selected because they have covered a lot in mathematics.From the eleven (11) Local Government Areas of Gombe State only eight (8) will randomly selected and used for the study. This limitationhowever, does not disprove the results of the study been generalized andused to improve teaching and learning.

Related Literature

The persistent declining of the performance of secondary school students in mathematics is a concern to the parents, government, and society, most especially SSCE which has increasingly attracted the attentionof numerous scholars from private and cooperate bodies as well asprofessionals. Olonade (2000), opined that mathematics is the language forsuccessful living in modern world as there is hardly any living being thatdoes not make use of it.

Abdullahi (2005) submitted that the opportunities to pursue and applymathematics are found in urban areas. However, the report re-affirmed that itis not to say that every student in rural setting will not perform well inmathematics or that everyone in an urban setting will have no problem inmathematics.A number of scholars such as cumber and Kereae (1975) in Olonade(2000) in their works put that the larger the school is, the better theMathematics performance of the students. But contrary to this, Abdulllahi(2005) asserted that the small size schools will lead to better performance ofstudents in Mathematics.

As opined by Cassor and Armstrong (1982) in Abdullahi (2005) asserted that gender-difference exist in the performance of students in Mathematics but scholars like Beeby (2008), Meller (2007) and Mauoby(2004) have contrary view of non existence of gender-difference among thesecondary school students.On the influence of teacher-variables, Forbomiye and Bayeh (1977) in Abdullahi (2005) expressed unanimous opinion that if the performance ofstudents in secondary school to be improved and realized, qualified andexperienced teaching staff as well as teaching facilities have to be adequate.

Research Methodology

Research Design

The study adopted a descriptive survey research design whichenablesinformation to be obtained from a representative sample of thepopulation to describe the situation as they exist. The influence of each ofthe four independent variables on the performance of secondary school students were thoroughly investigated.

The Population, Sampling and Sampling Techniques

The population of this study comprised of all senior secondary school students, teachers and principals of all secondary schools in the eleven local government area of Gombe state. However, stratified and purposivesampling techniques were used to select eight (8) local government areaswith five (5) from urban and three (3) from rural areas. The total number of schools selected were twenty; twelve (12) from urban and eight (8) fromrural areas. Eighty

(80) students were used from each of the twelve (12) inurban areas and fifty were used from eight (8) schools of the rural areas.

Therefore, the total sum of six hundred and twenty (620) and five hundred (500) students from urban and rural areas respectively, this gives thetotal sum of one thousand one hundred and twenty (1120) out of which sixhundred and twenty (620) and five hundred (500) are both maleand female respectively, stratified and purposively selected for the study.Each of these schools are under the umbrella of the State UniversalBasic Education Board (SUBEB), the student are of the same socioeconomicbackground, these schools are located in the same environmentalposition they are co – educational in nature and have presenting candidatesfor Senior School Certificate Examination (SSCE) for more than five yearsand these are the criteria for selecting the schools for the study.

Method of Data Collection

The investigators obtained a letter of introduction from the Research and Development Unit which served as a means by which the Ministry ofEducation officers, principals, vice principals (academic), examinationofficers and school counsellors in the schools to be used for the investigation were accorded the researchers the necessary assistance required for the datacollection. Records and information were therefore collected in person from Gombe State Ministry of Education (Management and Information Unit) andthe selected schools.

In each of the purposive and randomly selected schools, the research assistants were givenwhat to do as to data collection to be used in the study.

Method of Data Analysis

The descriptive statistical used for data analysis were the mean andstandard deviation (SD) as measures of central tendencies. The t-testanalysis was used to draw inferences on hypotheses one (1), two(2) and three(3), while Analysis of Variance (ANOVA) was used for the hypothesis four (4). All the postulated hypotheses were tested at 0.05 alpha level of significant to obtain the required results of the study.

Results:

Data collected from one thousand, one hundred and twenty (1120) students from twelve (12) in the eight (8) Local Government Areas of Gombe State selected using stratified and purposive sampling techniques were analysed using mean, standard deviation t-test and Analysis of Variance (ANOVA) to test the postulated hypothesis of the study to obtain the required results.

Hypothesis 0ne

There is no significant influence of school-location, on the performance of secondary school students in Mathematics.

Table II
Analysis of t-test results on the mean scores of the school-location on the performance of secondary school students in Mathematics.

Group	No of class	mean	Standard Deviation	D.F.	Calculated-t	Critical t-value	S
Urban	720	50.3	47.1	118	2.19	1.960	sign
Rural	400	28.4	29.5				

From the above table II, it can be seen that the calculated t-value of 2.19 is greater than the critical t-value of 1.960 therefore the null hypothesis of no significance is hereby rejected at 0.05 alpha level of significant, hence, there is significant influence of school-location on the performance of secondary school students in Mathematics.

Hypothesis Two
There is no significant influence of school-size on the performance of secondary school students in Mathematics.

Table III
Analysis of t-test results on the mean score of the school-size on the performance of secondary school students in Mathematics.

Group	No of class	mean	Standard Deviation	D.F.	Calculated-t	Critical t-value	S
Large	720	400	52.6 24.5	118	1.990	1.960 sign	
Small 42.320.2							

Looking at the table III above it can be deduced that, the calculated t-value of 1.990 is greater than the critical t-value of 1.960 at 0.05 alpha level of significant, hence, the null hypothesis of no significant influence is hereby rejected, therefore, there is significant influence of school-size in Mathematics.

Hypothesis Three
There is no significant influence of gender-difference on the performance of secondary school students in Mathematics.

Table IV
Analysis of t-test results on the mean scores of the gender-difference on the performance of secondary school children in mathematics.

Group	No of class	mean	Standard Deviation	D.F.	Calculated-t	Critical t-value	S
Male	620	57.5	25.4	118	2.61	1.960	sign
Female	50056.122.5						

Observing the above table IV, the calculated t-test of 2.61 is greater than the critical t-value of 1.960 at 0.05 alpha level of significant, the null hypothesis therefore, is rejected, hence, there is significant influence of gender-difference on the performance of the secondary school students in Mathematics.

Hypothesis four
There is no significance influence of teacher-variable on the performance of secondary school students in Mathematics.

Table V

Group	Degree of Freedom	Sum of Squares	Mean Squares	Calculated f-value	Critical f-value	S	
Year of Experience	2	1498	749	1338	2.13	2.92	sign
Qualification	5	6690	118.8				
Residuals	10	1188					

Critically looking at the above table V, it can be observed that the calculated f-value of 2.13 is less than the critical f-ratio of 2.92 therefore, the null hypothesis of no significant influence is hereby accepted. Hence, there is no significant influence on of teacher-variable on the performance of secondary school student in Mathematics of 0.05 alpha level of significant.

Conclusion
The study critically put into consideration the influence of school-location, school-size, gender-difference and teacher-variable of the performance of secondary school students in Mathematics in Gombe State using Senior School Certificate results of students from May/June 2002-2012 of the selected schools. From the results obtain in testing the four (4) postulated hypothesis at 0.05 alpha level of significant using t-test and Analysis of Variance (ANOVA) statistical mode of analysis, it can be concluded that, there is significant influence of each of school-location, school-size and gender-difference and there is no significant influence of teacher-variable on the performance of secondary school students in Mathematics.

Recommendations
The following recommendations are given based on the results of the findings:

1. Government needs to build more schools, classrooms and provide enough facilities to decongest the population of students in the school and classroom.

2. Qualified teachers need to be employed who are ready to work in the rural areas and be posted there to solve the problem of lack of teachers in rural areas.

3. Parents should develop interest on their children/wards study and provide all the necessary materials for them to work hard in their school subjects Mathematics inclusive.

4. Mathematics teachers should use different methods in their teaching so as to meet the individual differences on the students and the type of schools.

5. Mathematics teachers and students should be sent on seminars and workshops in other to boost their ego towards the teaching and learning of Mathematics in the schools.

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EFFECT OF IMPROVISED FURNACE ON STUDENTS' ACHIEVEMENT AND RETENTION IN GENERAL METALWORK IN TECHNICAL COLLEGES IN KATSINA STATE

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Abstract

This study determined the effect of improvised furnace on students' achievement and retention in General metalwork in Technical Colleges in Katsina State. The study adopted quasi-experimental design. It involved the use of experimental group, control group, pre-test – post test design. The population of 160 students from three technical colleges in Katsina state was used for the study. The instrument for data collection was General Metalwork Achievement Test (GMWAT) developed by the researcher. The achievement test consisted of 40-multiple choice items with four options of A-D. The test items were identified and selected from the content of NABTEB syllabus on General Metalwork. Test re-test method was used to establish the reliability of the instrument; the tests yielded 0.86 for the achievement test. Three lecturers and one industrial expert in metalwork technology were involved in both face and content validity of the improvised furnace and 40 multiple-choice test items. The results obtained from the test scores were compiled and analyzed using statistical tools such as; percentage, mean, and Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) in answering two research questions and testing two hypotheses at 0.05 level of significance. The teacher constructed furnace had positive effects on students' achievement and retention. The difference in achievement between those taught using improvised furnace and those taught using conventional teaching aids was found to be significant at 0.05 levels of significance. Based on the findings of the study, the researcher recommended that government, technical college principals and the different agencies should provide fund to procure the materials and component for designing and constructing furnace by the teacher for teaching heat treatment in technical colleges in Katsina State. Also, constant power supply, equipment and tools should be provided and distributed by the ministry of education to the technical colleges for construction of furnace for effective teaching of soldering and forging in Katsina State. The industries, government, non-governmental agencies and private enterprises and communities should provide components, consumable materials necessary for teaching foundry and supply the materials directly to the individual technical colleges in Katsina State.

Keywords: Achievement, Improvised Furnace, General Metalwork, Retention

Introduction

Technical Colleges are regarded as the principal vocational institutions in Nigeria; they give full vocational training to prepare students for entry into various occupations. Technical colleges give technical education that leads to the acquisition of skill and techniques in chosen occupation or profession to enable an individual earn a living which is a major focus of vocational and technical colleges. Technical education is described as result oriented. It bring about technological advancement and aims to provide manpower for employment and provide further training for those already qualified, so that they can keep up with modern working methods (Uwaifo, 2009).

Technical colleges offered courses in various trades such as block laying, bricks laying and concreting, motor vehicle mechanics (MVM), radio and television, electrical electronics, carpentry and joinery and welding and fabrication among others. General Metalwork as a course is been offered among Engineering trades such as MVM, Mechanical Engineering craft practice, Welding and fabrication craft practiced. General Metalwork (GMW) consists of topics and sub-topics relevant to these trades such as: heat treatment, soldering, foundry and forging. These aspects of the courses can be successfully delivered using furnace.

Furnace is a device used for heating and melting metals for industrial use (Yusuf, 2013). Examples of furnace are blast furnace, electric furnace, basic oxygen furnace and open hearth furnace. Their heating sources could be coal, charcoal, gas or electricity. It therefore follows that without a functional furnace, it will be difficult for the teacher to develop the students' skills in metal related work. Furnaces may be obtained in capacities ranging from small ones with a chamber measuring about 150 mm wide x 100 mm high x 200 mm deep, suitable for small tools, to huge structures of about 10 metres long for heat-treating large bars and forgings. Studies conducted by several authors such as: Ogundu (2015), Onaga, (2014), Mbata, (2010) revealed that in most technical colleges particularly in Katsina state this important teaching aids has not been available for instruction. Therefore, teaching heat treatment, soldering, foundry and forging in a workshop without functional furnace is a challenge to the teacher. The teacher's positive response to the challenge is shown by the extent of improvisation made towards effective instruction. One of such improvisation by the teacher is the improvised furnace. The use of this improvised furnace may lead to improved achievement of students in General Metalwork.

Achievement can be described as a measure of the ability of students to gain or reach a set goal through effort and skill. According to Ogbu (2016) achievement in education specifically refers to students' success in learning specified curriculum content. Ogbu, explained that a paper and pencil test, called achievement test, set specifically to cover the taught curriculum content, is usually involved. Achievement test is concerned with measuring what a candidate has learned (Olatoye&Aderogba, 2011).

Retention as one of the variable in this study is a significant goal of education. The method to be used for effective teaching and learning and for the learned material to be retained is a matter of great concern to teachers and educators. Bjorklund (2014) observed that teachers' method can greatly affect students' retention and skill acquisition. Ezugwu (2016) seems to be supporting this view when he stated that no single method of teaching has been found to provide all it takes for reasonable retention of knowledge by learning. The use of this instructional aid by the teacher may likely affect the student's achievement, retention and interest in areas of skill development and passing of their examination. According to Ndukwe (2016), at the end of the approved period of study, Technical College students take various examinations, particularly, the National Technical Certificate Examination. National Business and Technical Examination Board (NABTEB 2017) reported that there is a decline in student's achievement, retention and interest in General Metalwork. The document showed that students' achievement, retentions and interest in General Metalwork in Technical Colleges have been dwindling in recent time and the situation calls for immediate attention in the Technical Colleges. FME (2017) maintain that Technical Colleges are expected to produce craftsmen. In the last decade, Technical Colleges have recorded high failure rate of over 60 per cent in National Business and Technical Examination Board (NABTEB). It is also on record (NABTEB, 2017) from the Chief examiners reports that the General Metalwork students who sat for the examination performed very poorly.It has been observed by NABTEB (2016) that the persistent poor achievement and retention emanates mainly from the inappropriate teaching methods and instructional aids adopted by technical teachers. Moreover, NABTEB (2017) added that only 2 percent of the total students that were enrolled for the examination in General Metalwork attempted question on use of furnaces which they performed poorly.

Ideally, General Metalwork should be taught using the same equipment the practitioners are using in the field, because teaching General Metalwork involves the study of industrial technology, therefore requires industrial facilities that include machinery or simulated industrial setting known as workshop. This workshop must have amongst other equipment functional furnaces which are not available for teaching in technical colleges in Katsina state as such teachers use conventional teaching aids such as drawing, pictures of furnace. Hence, the researcher seeks to investigate the effects of improvised furnace on students' achievement and retention in General Metalwork in Technical Colleges in Katsina state, Nigeria.

Statement of the Research Problem

In technical colleges, students are educated theoretically and practically to make them employable in commerce and industry or any type of enterprises that requires the use of tools and machinery for the operation, production, preservation and distribution of goods and services (Joshua, 2012). For effective practical, instructional materials are made available for learning of the students such as furnaces where necessary. But lack of functional furnace may have contributed to the students' poor learning engagement in practical classes which is a major problem in Katsina State Technical colleges. There is lack of functional furnace in Katsina State Technical Colleges. Even where furnaces are available, there is generally power instability in the country which may affect the use of these furnaces. Lack of functional furnace has possibly led to poor achievement, retention and interest of the students in external examination such as National Business and Technical Examination. Candidates performed poorly because, according to the report from NABTEB Exam Ethics project (2017), students were unable to attempt questions on blacksmith shop equipment and other equipment for General Metalwork which contributed to poor achievement of students in General Metalwork. It is this background that the research investigated effect of improvised furnace on students' achievement and retention in General Metalwork in Technical Colleges in Katsina State, Nigeria.

Aim and Objectives of the Study

The aim of this study is to determine the effect of improvised furnace on students' achievement and retention in General Metalwork in Technical Colleges in Katsina State, Nigeria. Specifically, the study determined:

1. Effect of improvised furnace on students' achievement in General Metalwork in Technical Colleges in Katsina state, Nigeria.

2. Effect of improvised furnace on students' retention of learning in General Metalwork in Technical Colleges in Katsina state, Nigeria.

Research Questions

The following research questions guided this study:

1. What is the effect of improvised furnace on student's achievement in General Metalwork in Katsina State?
2. What is the effect of improvised furnace on student's retention of learning in General Metalwork in Katsina State?

Research Hypotheses

The following null hypotheses were formulated and tested at 0.05 levels of significance:

$HO_{1:}$ There is no significant difference in the mean achievement of Technical College students taught General Metalwork using improvised furnace and those taught with conventional teaching aids in Katsina State.

$HO_{2:}$ There is no significant difference in the mean retention of Technical College students taught General Metalwork using improvised furnace and those taught with conventional teaching aids in Katsina State.

Literature Review

The conceptual framework of this study was based on effect of improvised furnace on students' achievement, retention and interest. Interrelationship between the independent and the dependent variables revealed that improvised furnace determined the outcome of achievement and retention.Achievement refers to the acquisition and initial retention of learning items such that the learner easily makes use of the knowledge or skills acquired when the opportunity is presented. It is also conceptualized as a major change in the performance of students due to their exposure to specific programme of instruction. It is a major focus in the learning process, and cannot be divulged from retention due to the fact that some measures of materials learned have been returning (Heidt, 2012). Students must know and use the principles of science and mathematics.

The achievement and retention of practical skills calls for coordinated interplay of the brain, eyes and the hands. In practice it is imperative to have various equipment, tools, materials and physical facilities. The problems of acquiring technical skills in Nigeria can be affiliated to the lack of achievement and retention of the technical schools put in place for acquiring of these practical skills. Barky (2010) pointed out that the factors affecting the effect of improvised furnace on students achievement and retention can be traceable to our unwillingness and late appreciation of the wonders of technology, hence our present backwardness. Other problems militating against adequate operations of workshops are none availability of power, few institutions that profess technology; products of Technical Colleges, Polytechnics and Universities are not adequately exposed to sufficient practical experience in their fields. To this effect, the teaching and non-teaching staff should be encouraged to be vigilant and give immediate reports concerning deterioration in plants, such as damage to window panes, leaks in roofs and cracks in wall as the improvised blast furnace used in the teaching learning process to enhance achievement and retention can only succeed with decent physical plant in place. In addition, students have a major role to play in ensuring proper use and upkeep of plants. They should be made to appreciate that the institution and its property belong to them. It is therefore, incumbent upon them to see that the plants are properly used and maintained.

Students should be brought up to always ensure that they keep buildings, toilets, chalkboards and furniture free from defacements and obscene writings. So also, they should be trained to always give prompt reports of deterioration in plan. For improvised furnace to have the desired effect on the achievement and retention of students, appropriate tools and equipment such as hammer, tungsten, Anvil, bellow and the furnace must not only be available, but must also be properly managed.

Retention is measured in collaboration with achievement. This means that closely related to achievement is retention. Hornby (2000) defines retention as the ability to remember experiences and things learnt. Similarly, Kundu and Tutoo (2002) posited that retention is the preservation of mind. These imply that the amount of knowledge learnt and kept, skill maintained or problem-solving behaviors manifested consistently reflects what is retained. Thus retention of statistical knowledge is the ability of a learner to keep and remember as well as recall or reproduce the acquired knowledge or some part of the knowledge after some period of time must have elapsed. This is the ability to recall or remember things learned previously or to store information for long periods. Maduabum (2015) reported that stimulating learning environment, retention, and activity oriented teaching strategies are all that the learners need to retain new learned information. Therefore, to improve students' achievement level in General Metalwork implies to improve the level at which they retain the concepts of General Metalwork learnt. Hence the researchers see the need to find out if improved furnace approach to the teaching of General Metalwork could improve the retention of students in technical colleges.

In a study carried out by Uzoagulu (2006), it was discovered that poor student achievement and retention in Technical Colleges in Nigeria is as a result of inadequate and non-functional training facilities.

Ogundu, (2015) carried out research on the effect of an improvised furnace on students' performance in heat treatment in technical colleges in Rivers State. The study adopted research and development incorporating quasi-experimental design. It involved the use of control group, pre-test – post test design. The population of 194 students from four technical colleges in Rivers State was used for the study. The instrument for data collection was made up of Heat Treatment Achievement Test (HTAT) developed by the researchers. The achievement test consists of 50-multiple choice items with four options of A-D. The results obtained from the test scores were compiled and analyzed using statistical tools such as; percentage, mean, and analysis of covariance (ANCOVA) in answering the research question and testing the hypothesis at 0.05 level of significance. In his finding, improvised furnace had positive effects on students' performance in heat treatment with a mean gain of 4.61. The difference in performance between those taught using improvised furnace and those taught using conventional teaching aids was found to be significant at 0.05 levels of significance. Based on the findings of the study, the researcher recommended that government, technical college principals and the different agencies should provide fund to procure the materials and component for designing and constructing furnace by the teacher for teaching heat treatment in technical colleges in Rivers State. Also, constant power supply, generators, accumulators, anvil, steel vessel, pipes and electric blower should be provided and distributed by the ministry of education to the technical colleges for construction of furnace for effective teaching in Rivers State. The industries, government, nongovernmental agencies and private enterprises and communities should provide components, consumable materials necessary for teaching heat treatment and supply the materials directly to the individual technical colleges in Rivers State.

A study was carried out by Adekunle (2013) on the effect of computer-based instruction on students' achievement and retention in auto-mechanics in technical colleges in Oyo State, Nigeria. The design of the study was a quasi-experimental study precisely pretest posttest nonequivalent control group design. The sample size of the study comprised 86 NTC II Motor Vehicle Mechanic Work Students selected through purposive sampling technique. The findings of the study revealed that computer-based instructional medium was more effective in enhancing achievement and retention that the traditional teaching method. Mangal (2010) observed that appropriate learning environment and methods, functional teaching material and a motivating teacher have positive effect on students' interest in learning.

Mboto et al. (2011) finding out the effect of improvised material on students' academic achievement and retention on the concept of radioactivity. The study adopted the pretestpost test non-equivalent control group design and was carried out in Calabar Education Zone, Cross River State Nigeria. A total of two hundred and forty seven (247) Senior Secondary School III Physics students took part in the study. The Analysis of Covariance (ANCOVA), Multiple Analysis (MCA) and t-test were used to analyze the data. The results of the study showed a significant difference in academic achievement between the experimental and control groups in favour of the experimental group, a significant difference in the mean academic achievement between the male and the female students in favour of the male students and a significant difference in the retention between the experimental and control groups in favour of the experimental group. The study recommended among others the use of improvised material in the teaching of physics where the accredited ones are lacking.

Enohuean (2015) investigated effects of instructional materials on the academic achievement and retention of SS 2 biology students in Delta State. The study sample consisted of 86 SS2 biology students randomly selected from a population of 5,626 students drawn from 18 public schools. An instrument designed and developed from past WAEC questions by the researcher known as Biology Achievement Test (BAT) was validated by some senior lecturers in science, English and statistic from Ahmadu Bello University and senior biology teachers in Delta State. The instrument used was tested and certified to be reliable at 0.65 coefficients. Quasi-experimental design was adopted which involves two groups: experimental and control groups. The experimental group was subjected to treatment using instructional materials but the control group was taught without any instructional materials. Four null hypotheses were tested using t-test statistics. The following major findings were made: There is a significant difference between the mean academic achievement scores of students taught using instructional materials (EG) and those taught without the use of instructional materials (CG).There is no significant difference in the mean achievement scores of male and female students taught biology concepts using instructional materials. There is significant difference in the mean retention scores of students taught with instructional materials and those taught without instructional materials. There is significant difference in the retention ability of male and female students exposed to the use of instructional materials. On the basis of these findings some recommendations were made, one of which is teachers should make use of instructional materials to facilitate the teaching of biology at secondary school level.

Research Methodology

This study adopted quasi-experimental research design. Quasi- experimental design involved the use of pre-test and post-test design with experimental and control groups. This design implies that intact classes were used for the study and that this experimental design helps in controlling almost all the threats to internal validity of an experiment especially in education. This is because, using selected students from the classes will leave out some students who could influence the ones used in the study which can be a threat to internal validity. This design was necessary because it will not be possible for the researcher to randomly sample the students and assign them to groups without disrupting the normal academic programme of the Technical Colleges involved in the study.

The population of the study comprised 160 final year students of the three Technical Colleges offering General Metalwork. Final year students were used because topics that required the use of furnace are in Technical College III scheme of work. The population of 160 students was manageable, hence it was used for the study. However, selection of the Technical Colleges into the experimental and control groups was carried out using the simple random sampling techniques. Therefore, Government Technical College Funtua was randomly selected as the experimental group while Government Technical College Mashi and Ingawa served as control groups.

The improvised furnace was constructed following these steps:

1. The improvised furnace is an improvised teaching material that is made up of sheet metal, folded and twisted sheet metal, blower, 1.5mm plate, angle iron, socket, plat bar and screw. The body was made up of steel plate folded to the required shape. It is lined with welded angle iron ½ inches and is fired with charcoal using an electric blower connected to a low voltage generator.

2. The National Business and Technical Examination Board Syllabus in General Metalwork was carefully analyzed to determine which aspects of the syllabus require the use of furnace in teaching. After the content areas have been identified, the specific tasks requiring the furnace were identified as heat treatment, soldering, forging and foundry.

The conduct of the study took place during the normal school lesson periods, following the normal time-table in each school. The teachers in each school taught their classes. Prior to the commencement of the lesson, the test items were administered as pre-test to both the treatment and control groups on the first day.

The teaching started from the second day. During the lessons the teachers taught the experimental group General Metal Work using furnace, adhering strictly to the lesson procedures prepared by the researcher. The control group was taught the same General Metalwork topics using conventional teaching aids. As the lessons were going on, the researcher used the General Metalwork teachers as research assistants to supervise the use of improvised furnace. At the end of teaching each topic, the post-test was administered to the two groups and the scores were recorded. The field work lasted for eight weeks from when the furnace was constructed which was the period of pretest administration, teaching of the students in both the experimental and control groups and then administration of posttest and post-posttest.

This study has three research questions and three hypotheses. The research questions were answered by comparing the pretest and posttest of experimental and control groups. The null hypotheses were tested using inferential statistics. Analysis of Co-variance ANCOVA was used to analyse the hypotheses at 0.05 level of significance using Statistical Package for Social Sciences (SPSS) version 20.

Results

Research Question 1:

What is the effect of improvised furnace on student's achievement in General Metalwork in Katsina State?

Table 1: Mean and standard deviation of pretest and posttest scores of students taught General Metalwork with Improvised Furnace in Achievement Test

Group		Pretest		Posttest		
	N	Mean	SD	Mean	SD	Mean Gain
Experimental	62	53.12	11.92	68.71	9.22	15.59
Control	98	50.59	9.97	56.24	8.75	5.65

Table 1 shows that the students who were taught General Metalwork using Improvised Furnace had mean achievement score of 68.71 with a standard deviation of 9.22 at the post-test against their pre-test mean achievement score of 53.12 and standard deviation of 11.92 while those who were taught using conventional teaching aids had mean score of 50.59 with a standard deviation of 9.97 while against their pretest mean score of 53.12 with standard deviation 11.92. There were mean gain scores of 15.59 and 5.65 for the two groups respectively. This shows that the students who were exposed to Improvised Furnace had higher mean score than those taught using conventional teaching aids.

Research Question 2:

What is the effect of improvised furnace on student's retention of learning in General Metalwork in Katsina State?

Table 2: Mean and standard deviation of posttest and delayed posttest scores of students taught General Metalwork with Improvised Furnace in Retention Test

Group		Posttest		Delayed Posttest (Retention Test)		
	N	Mean	SD	Mean	SD	Mean Gain
Experimental	62	68.71	9.22	63.19	11.32	5.52
Control	98	58.44	8.75	56.24	11.64	2.20

Table 2 shows that the students who were taught General Metalwork using Improvised Furnace had mean score of 63.19 with a standard deviation of 11.32 at the post-test against their delayed or retention score of 63.19 and standard deviation of 11.32 in the experimental group. The control group showed that students had 58.44 with standard deviation of 8.75 at the posttest and 56.24 with standard deviation of 11.64 at the delayed or retention test. Mean gain scores of 5.52 and 2.20 respectively were recorded for the two groups which showed that the students who were exposed to Improvised Furnace had higher retention mean score than those taught using conventional teaching aids.

Hypotheses Testing

HO_1: There is no significant difference in the mean achievement scores of Technical College students taught General Metalwork using improvised furnace and those taught with conventional teaching aids in Katsina State.

Table 3: Summary of Analysis of Covariance (ANCOVA) for Test of Significance of Effect of Treatment on Students' Achievement in General Metalwork

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	13148.863[a]	2	6574.431	83.474	.000
Intercept	44171.765	1	44171.765	560.840	.000
Covariate (Pretest)	723.750	1	723.750	9.189	.003
Main Effect (Treatment)	10515.766	1	10515.766	133.516	.000
Error	24966.937	157	78.760		
Total	1287116.000	160			
Corrected Total	38115.800	159			

*: Significant at F<0.05 levels

Table 3 showed the ANCOVA result of the comparison of posttest scores of students in Experimental Group and the Control Group. An examination of the Table shows ($F_{(1,\ 159)} = 133.516$, $p < 0.05$). On the basis of this, hypothesis one was rejected. Therefore, there was significant difference in the achievement of students taught General Metalwork using Improvised Furnace and those taught using conventional teaching aids. This implies that Improvised Furnace enhances academic achievement of students better than conventional teaching aids.

HO_2: There is no significant difference in the mean retention scores of Technical College students taught General Metalwork using improvised furnace and those taught with conventional teaching aids in Katsina State.

Table 4: Summary of Analysis of Covariance (ANCOVA) for Test of Significance of Effect of Treatment on Students' Retention in General Metalwork

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1953.277[a]	2	976.638	7.413	.001
Intercept	20273.239	1	20273.239	153.874	.000
Covariate (Pretest)	148.277	1	148.277	1.125	.290
Main Effect (Treatment)	779.940	1	779.940	5.920	.016
Error	41765.473	157	131.752		
Total	1227130.000	160			
Corrected Total	43718.750	159			

***: Significant at F<0.05 levels**

Table 4 showed the ANCOVA result of the comparison of posttest scores of students in Experimental Group and the Control Group. An examination of the Table shows ($F_{(1, 159)}$ = 5.920, $p < 0.05$). On the basis of this, hypothesis two was rejected. Therefore, there was significant difference in the mean retention scores of students taught General Metalwork using Improvised Furnace and those taught using conventional teaching aids. This implies that Improvised Furnace enhances retention of students better than conventional teaching aids.

Discussion of Findings

The finding on improvised furnace revealed that it enhances academic achievement of students. This was supported by Ogundu, (2015) who found out that improvised furnace had positive effects on students' performance in heat treatment. In the same vein, it is in agreement with the finding of Ojo(2010) who evaluated human and material resources for teaching Metalwork in the secondary schools in Ekiti State and found out that eight items (8) out of twelve (12) which is 67% of human and material resources for teaching metalwork were available in Ekiti State and that out of ten (10) material resources listed six (6) were often utilized because of lack of adequate knowledge by the metalwork teachers and poor condition of facilities as such their academic performance were enhanced.

The findings on improvised furnace that enhanced retention of students is in agreement with the finding of Mboto et al. (2011) who investigated the effect of improvised material on students' academic achievement and retention on the concept of radioactivity and found out that the study showed a significant difference in academic achievement between the experimental and control groups in favour of the experimental group, a significant difference in retention between the experimental and control groups in favour of the experimental group.

Conclusion

Based on the findings of this study, it can be concluded that Improvised Furnace enhances academic achievement of students more than conventional teaching aids. The retention of learning by students was also enhanced as was revealed in the study. This study has strong implication for teaching and learning processes in Nigerian technical colleges as made evident in the findings of the study.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Teachers should endeavour to utilize Improvised furnace for teaching in technical colleges.
2. Government, technical college principals and the different government agencies should provide fund to procure the materials and component for designing and constructing furnace by the teacher for teaching heat treatment in technical colleges in Katsina State.
3. Stakeholders in Technical Colleges Board should ensure use of improvised furnace in all the Technical Colleges to enhance student's practical learning.
4. Constant power supply, generators, accumulators, soldering iron, solder, anvil, steel vessel, sheet metal and electric blower should be provided and distributed by the ministry of education to the technical colleges for construction of furnace for effective teaching of soldering and forging in Katsina State.

5. The industries, government, non-governmental agencies and private enterprises and communities should provide components, consumable materials necessary for teaching foundry and supply the materials directly to the individual technical colleges in Katsina State.
6. Government and curriculum developers should embrace student-centered learning approach in teaching and learning process so that instructional package like Improvised furnace will be known by various stakeholders in education.

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LEVEL OF AVAILABILITY AND UTILIZATION OF SCIENCE LABORATORY EQUIPMENT AS PERCIEVED BY SECONDARY SCHOOL SCIENCE TEACHERS AND STUDENTS IN BOSSO METROPOLIS,NIGER STATE

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Abstract
This study investigated the level of availability and utilization of science laboratory equipment in secondary schools in Bosso Metropolis of Niger State. A research question was raised to guide the study. The research design used for the study was a descriptive survey design. The instrument used for the study was the Availability and Utilization of Science Laboratory Equipment Questionnaire (AUSLEQ). Reliability of the instrument was determined and reliability coefficient of 0.84 was obtained. One hundred and eighty science students (180) and twenty science teachers (20) totaling two hundred (200) made up the population of the study. The responses of the students and teachers to the instrument were collected and analyzed using mean and standard deviation. The result of this study revealed that, there are no adequate science laboratory equipment for effective teaching and learning of sciences in majority of secondary schools in Bosso metropolis of Niger State. Even the little that are available are not well equipped non effectively utilized by science teachers during teaching and learning process. The study recommends that individual science teachers should improvise as much as possible any equipment that can aid effective teaching and learning of sciences in their schools. Government and other stake holders in education should properly equip the science laboratories at secondary school level of our education. In addition to the foregoing, Government should employ more science teachers and develop them through capacity training through Workshop Seminars and Conferences.

Key words: Equipment, Laboratory, Science, Students and Teachers

Introduction
Science has been of great importance globally for sustainable and socio-economic development as well as for technological advancement of nations. Knowledge of science and technology is therefore a requirement for individual as well as national development as it provides solution to challenges faced by mankind. These challenges include emergences of new drug resistance disease, dangers of nuclear war, explosions and global warming among others (Omosewo, 2011).Effective application of knowledge of science had resulted to rapid changes taking place in medicine, industry, communication and agriculture. Science as an agent of development plays an important role in bringing about these changes through technological advancement, national wealth enhancement, health improvement and industrialization. This is why scientific and technological breakthrough is usually the goal of any developing nation like Nigeria (Arthur, 2010).

In spite the importance of science to national development, secondary school science students' learning outcomes has not been encouraging, it has been observed that Secondary School science students have been exhibiting dwindling interest in the study of science over the past few years (Ehindero, 2014). This among other reasons explains the reported low enrolment and consistent poor learning outcome in sciences by Secondary School Students (Omosewo, 2011). The reason for the negative attitude of the students towards the science subjects which is responsible for their low learning outcomes may not be unconnected with the teaching style adopted by science teachers which often times is rote learning and memorization of formulas as opposed to the more effective practical and hands-on approach. This ineffective approach is often blamed on the paucity of relevant and effective science equipment(Nwagbo, 2014).

The negative trend spells doom for our National Development as science is believed to be the bedrock of technological development of any Nation. To further compound the problem, science subjects are generally seen as the most difficult subjects in the school curriculum as asserted by Isola (2010).This results to ineffective teaching and learning of science. Ineffective teaching and learning of sciences as well as consistent students' poor learning outcomes has become a major concern to all stakeholders in the educational sector. The only remedy to this national embarrassment and the way out of this predicament may be for teachers to embrace an effective instructional strategy. Effective instructional strategies without relevant and effective laboratory equipment cannot in any way address this challenge (Aina, 2012).The most effective approach to science teaching therefore, is to support theoretical explanations with actual practices in the laboratory by using science laboratory equipment (Ojediran, Oludipe & Ehindero, 2014).

A study conducted by Bello (2012) on the level of availability and utilization of science laboratory equipment on Students' Academic Achievement in Senior Secondary School Science showed that the use of appropriate teaching equipment and teaching method is critical to the successful teaching and learning of science. Taale and Antwi (2012) also reported that inadequate exposure of science students to science laboratory work at the secondary school level has been a major cause of first year University students' inability to comprehend and apply scientific knowledge.

A professional qualified Science Teacher, no matter how well trained, he or she would be unable to put his ideas, opinions and experiences into practice if the school lacks laboratory equipment necessary for him or her to translate his competence into reality in the classroom. In order to attract and retain good students in science classes, the learning environment must be made more student-friendly and this can only be achieved by supplying the relevant and effective laboratory equipment and encouraging teachers to utilize them in order to enhance the students' learning outcomes (Taale & Antwi, 2012). Practical work at senior secondary schools requires availability of functional laboratory experiment, science teachers' ability to demonstrate to the students how to carry out the practical exercises as well as the availability of the equipment for students to conduct the practical exercises on their own either individually or in small groups. This is because laboratory practical teaching can only be said to have taken place when students actively participate in the learning experience rather than sit as passive learners.

Laboratory practical teaching involves the use of equipment or apparatus in teaching such that, teaching and learning activities is based on real life experience. Availability and utilization of laboratory equipment and apparatus helps learner to transform scientific knowledge or information into their personal knowledge which they can apply in different situations. It also enables the students to acquire manipulative skills of science laboratory equipment.

Effective utilization of laboratory science equipment also help students to construct mental models that prepares them for higher order performance such as applied problem solving and ability to transfer knowledge and scientific skills from one field of study to another. In laboratory practical class, teacher serves as a facilitator, motivator, guide or a coach but not as a sage on a stage (Akuezillo, 2005).

Statement of the Research Problem

Despite the importance of the knowledge of science to humanity in particular and society in general, students' learning outcomes in sciences has been below expectation (Taale & Antwi, 2012). This implies that science students are performing poorly at their final SSCE examinations. There is therefore, the need for a research study to find out whether there are enough laboratory science equipment for science teaching and learning at our secondary school level of education. Not only that, but to also find out if the available laboratory science equipment are effectively utilized by the science teachers at secondary school level. This is the major reason why this study is aimed at assessing the level of availability and usage of science laboratory equipment on learning outcome of secondary school science students in Bosso Local Government Area of Niger State.

Objective of the Study

The specific objective of this study was to determine:

1. Level of availability of laboratory science equipment and the extent to which science teachers utilizes them for the teaching and learning of sciences subjects as perceived by science teachers and students in senior secondary schools Bosso Local Government Area of Niger State

Research Question

The following research question was raised and answered using mean and standard deviation during the study.

1. What is the level of availability and utilization of science laboratory equipment for the teaching and learning of sciences as perceived by science teachers and students in secondary schools in Bosso metropolis of Niger State?

Methodology

This study employed the descriptive survey design involving the use of questionnaires to collect data from the subjects. The population of this study consist all the one thousand and two hundred (1,200) science students and one hundred and fifty (150) science teachers in Bosso metropolis of Niger State. The sample size of this study is two hundred (180 science students and 20 science teachers). Four secondary schools were randomly selected from Bosso metropolis for the study. From each of the four selected schools, one intact science class was also randomly selected with cumulative student population of one hundred and eighty (180) science students. Science teachers of the four schools totaling twenty (20) were used for the study.

The research instrument used for data collection was carefully structured by the researchers to obtain the various personal views of the science teachers and students on the level of availability and utilization of science laboratory equipment in Bosso metropolis of Niger State, The questionnaire contains two sections A and B. Section (A) concerns the Bio data of the respondents while section (B) contain items or statement for obtaining the respondents' views about the level of availability and utilization of science laboratory equipment in their schools. The instrument was validated by three science teachers and three science laboratory technologists. Their suggestions, observations and recommendations guided the production of the final copy of the instrument. Pilot study was conducted and a reliability coefficient of 0.84 was obtained.

A 5 – scale (Likert type) of. Strongly agree (SA), Agreed (A), Undecided (UD), Disagreed (D) and Strongly Disagree (SD) was used. The scoring was SA=5mks, A=4mks, U=3mks, D=2mks, and SD=1mk. The decision rule is 3. This is because, 5+4+3+2+1=15. Therefore, 15/5=3 and any score above 3 is accepted (agree) while any score less than 3 is rejected (disagree).

The researchers visited the selected schools and were granted permission to use the respondents (science teachers and students of the schools) for the study. Thereafter, they were introduced to both the science teachers and students of the schools and they were given orientation on the purpose of research. In each of the schools used for the study, one intact SS2 class was randomly selected and used for the study. This implies that one class of SS2 science students was used in each of the four schools. All the science teachers of the selected schools were also used for the study. The researchers went to each class of SS2 to administer the instrument. The questionnaires were distributed to both science teachers and SS2students of the schools. The respondents were not allowed to communicate with one another when they were responding to the questionnaires. The questionnaires answered were collected back from the respondents after they have been properly filled. One hundred percent (100%) returns rate was recorded for both students and teachers. Data collected were analyzed using mean and standard deviation

RESULTS

Research Question

What is the level of availability and utilization of science laboratory equipment for the teaching and learning of sciences as perceived by science teachers and students in secondary schools in Bosso metropolis of Niger State?

Table 1: Mean and Standard Deviation on the level of availability and utilization of science laboratory equipment for the teaching and learning of sciences as perceived by science teachers and students in secondary schools in Bosso metropolis of Niger State

S/N	ITEMS	N	MEAN	SD	DECISION
1	Science laboratories are available for science teaching and learning in my school	200	4.40	1.01	Agree
2	Only multipurpose science laboratory is available for science teaching and learning in my school	200	3.55	0.15	Agree
3	There is enough science laboratory equipment for every science practical class in my school	200	2.43	0.08	Disagree

4	All the available science laboratory equipment in my school are in good standard	200	2.70	0.09	Disagree
5	The available science laboratory equipments are handled carelessly by science teachers in my school.	200	3.53	0.13	Agree
6	Science laboratories are effectively utilized by science teachers during teaching in my school	200	2.37	0.07	Disagree
7	Available science laboratory equipment are not accessible by science teachers during teaching and learning process.	200	3.28	0.10	Agree
8	There are qualified science laboratory attendants in my school	200	2.29	0.05	Disagree
9	Science students do not know the location science laboratories in my school	200	3.69	0.14	Agree
10	Non availability of science laboratory equipment has negative effects on science students.	200	3.76	0.16	Agree

Table 1 shows the mean and standard deviation of the level of availability and utilization of science laboratory equipment for the teaching and learning of sciences as perceived by science teachers and students in secondary schools in Bosso metropolis of Niger State and the table reveals the followings:

ITEAM 1:
On whether Science laboratories are available for science teaching and learning in my school, the table reveals the mean score of 4.4 (with standard deviation of 1.01) which is higher than the decision mean of 3.00. This indicates that, most Secondary Schools in Bosso Metropolis of Niger State have science laboratories for science teaching and learning.

ITEAM 2:
On whether it is only multipurpose science laboratory that is available for science teaching and learning in my school, the table reveals the mean score of 3.55 (with standard deviation of 0.15) which is higher than the decision mean of 3.00. This indicates that, most Secondary Schools in Bosso Metropolis of Niger State have only multipurpose science laboratories for science teaching and learning. Implicitly they do not have separate laboratories for Biology, Chemistry and Physics which is supposed to be the case under normal circumstances.

ITEAM 3:
On whether there is enough science laboratory equipment for every science practical class in my school, the table reveals the mean score of 2.43 (with standard deviation of 0.08) which is less than the decision mean of 3.00. This indicates that, neither science laboratories nor multipurpose science laboratories in most Secondary Schools in Bosso Metropolis of Niger State lack the pre-requisite equipment for science teaching and learning.

ITEAM 4:
On whether the available science laboratory equipment in my school are in good standard, the table reveals the mean score of 2.70 (with standard deviation of 0.09) which is less than the decision mean of 3.00. This indicates that, even the few available equipment in multipurpose science laboratories in most Secondary Schools in Bosso Metropolis of Niger State are not in good standard.

ITEAM 5:
On whether the available science laboratory equipment are handled carelessly by science teachers in my school, the table reveals the mean score of 3.53 (with standard deviation of 0.13) which is higher than the decision mean of 3.00. This indicates that, most Secondary Schools science teachers in Bosso Metropolis of Niger State cannot handle the few available science equipment in their laboratories. This may be as a result of the fact that most science teachers are not qualified and are no exposed to any kind of Professional Career Development Program to improve their subject content knowledge.

ITEAM 6:
On whether Science laboratories are effectively utilized by science teachers during teaching in my school, the table reveals the mean score of 2.37 (with standard deviation of 0.07) which is less than the decision mean of 3.00. This indicates that, even the multipurpose science laboratories in most Secondary Schools in Bosso Metropolis of Niger State are not properly utilized. This may be as result of lack of equipment in them,

ITEAM 7:
On whether even the available science laboratory equipment are not accessible by science teachers during teaching and learning process, the table reveals the mean score of 3.28 (with standard deviation of 0.10) which is higher than the decision mean of 3.00. This indicates that, science teachers do not have access to laboratory mainly because there are no equipment in so-called science laboratories.

ITEAM 8:
On whether there are qualified science laboratory attendants in my school, the table reveals the mean score of 2.29 (with standard deviation of 0.5) which is less than the decision mean of 3.00. This indicates that, most Secondary Schools in Bosso Metropolis of Niger State do not even have trained science laboratory Technologist. This indicates lack of functional science laboratory the schools.

ITEAM 9:
On whether Science students know the location science laboratories in my school, the table reveals the mean score of 3.69 (with standard deviation of 0.14) which is higher than the decision mean of 3.00. This indicates that, science students do not know where their school

laboratory is located simply because there are no equipment the laboratory of most Secondary Schools in Bosso metropolis of Niger State.

ITEAM 10:
On whether non availability of science laboratory equipment has negative effects on science students, the table reveals the mean score of 3.76 (with standard deviation of 0.16) which is higher than the decision mean of 3.00. This attest to the fact that, science students are performing poorly at their final SSCE examinations because lack of laboratory in their school negatively affect the teaching and learning process of sciences in their schools.

Discussion
Findings on the Items 1, 2, 7 & 9 is in line with finding of Omosewo(2011), Bello(2012) and Aina (2014) who reported that most secondary schools do not have functional laboratory for effective teaching and learning of science.
Findings on the Items 3, 4 & 5 is also in line with the findings of Ehindero (2014), Isola (2010) and Nwagbo & Uzoma(2014).Who all opined that science laboratory in most of our secondary schools are not well equipped.
Findings on the Items 6, 7 & 10 is in line with that of Taale & Antwi (2012) and Nwagbo & Uzoma (2014) that most science laboratories are not effectively utilized for science teaching and learning either because of lack of qualified science teachers or lack of qualified science laboratory technologists

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CURRICULUM ISSUES IN SCHOOL MANAGEMENT AND ADMINISTRATION

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Abstract
The Nigerian Education system is in the process of continuous reform therefore, this paper examines the curriculum issues in school management and administration. The paper also identified and explained some categories of essential knowledge needed by education planners such as, curriculum issues in education, classroom management and responsibilities of a school administrator. The paper further explained, possible curriculum dilemmas, concept of classroom management, importance of classroom management, communication in the classroom and importance of communication in the school. Some recommendations were made such as developing mutual trust, learn how to communicate effectively, develop proper listening habits, taking feedback of stakeholders is one of curriculum development strategy, use of technology for fulfillment of demands of stakeholders, and seminars, panel discussions, orientation programmes and workshops should be arranged for involvement of teachers as curriculum developers.

Key Words: Curriculum, School management, Classroom, Communication

Introduction

The Nigerian Education system is in the process of continuous reform. The planning, implementation and management of changes in the curriculum are among the major issues at the forefront for policy makers. Curriculum plays an important role in the field of teacher education. Curriculum is the planned interaction of pupils with instructional content, materials, resources, and processes for evaluating the attainment of educational objectives. Curriculum is used in several meanings. There are also a number of definitions of the term, curriculum.

The word curriculum is derived from the Latin word 'currrere' which means 'run' and it signifies a 'run-away' or a course which one runs to reach a goal.

Curriculum issues in Education

A curriculum guides the instructional lessons that teachers use. A curriculum defines what the learner will learn and can possibly guide when the learner learns the information from the lesson. A curriculum offers teachers the ideas and strategies for assessing student progress.

A student must meet certain academic requirements in order to go to the next level. Without the guidance of a curriculum, teachers cannot be certain that they have supplied the necessary knowledge or the opportunity for student success at the next level, whether that the levels involve a high school, college or career. Curriculum can help students to achieve some personal control over their learning, to plan their semester, and to manage their time effectively, and describes Active Learning. Students often conceive of learning as the acquisition of correct information, but they may not know what it means to take an active role in the process, beyond rote memorization and recall, students should be given some idea about what they should already know and what skills they should already have before taking course so they can realistically asses their readiness, sets the course in a Broader Context for Learning, describes

Available Learning Resources. Curriculum development is the process of creating planned syllabus, teaching, training, and exhibition modes. It is a term used to refer to the process of instituting and putting in place precise guidelines of instruction for the curriculum. It describes ways in which teaching and different training organizations plan and guide learning which can be in groups or as an individual. Curriculum development is a local, regional, or state/provincial level process that student teachers often have difficulty comprehending (Parker, 2003). In his opinion, it is something undertaken by authorities (e.g., regional advisory committee members) with years of experience in the teacher education system.

The expectation of the teacher candidates, often enough, is that they will learn how to teach and thereby become effective at transmitting the knowledge, skills, and attitudes associated with a particular subject or programme. Successful practice in the classroom is inextricably linked to curriculum development-the everyday decisions about both what to teach and how to teach.

Curriculum issues in School communication management

The importance of effective communication cannot be overemphasized for one specific reason. Everything that organizations do involves communication. Effective communication is the cement in the management process, which holds it together and it is a prerequisite for management functions (Prinsloo in Van Deventer & Kruger, 2011). Managing curriculum change is a major challenge for managers because they are responsible for providing information that will result in efficient and effective curriculum implementation (Guo & Sanchez, 2005).

Effective communication increases the quality of any relationship and facilitates the implementation of curriculum change. Communication is necessary for enabling organizations to carry out their functions (Mngoma, 2007).

In a school environment, several issues should be communicated to the different stakeholders. Such issues include the curriculum and other school activities. The communication process becomes a chain that facilitates understanding of what needs to be done in the organization and communication channels should transmit messages from top to bottom, bottom to top and side to side. Communication as a concept is defined by Clampitt (2013) as the transmission and/or reception of signals through some channels that beings interpret based on a probabilistic system that is deeply influenced by context. Communication involves understanding between the sender of the message and the receiver of the message (Guo & Sanchez, 2005). In terms of the context of this study, district officials send information or a message (encoded by using codes) to the receiver (School principals and educators) in words or other symbols, unless understood by the principal and educators (receiver, decoded), the message has not been communicated. The use of feedback in communication is to ascertain that clear messages are received through two ways communication (Mngoma, 2007) and indicate the effectiveness of a previous communication. In communication, feedback shows how the communicated message has been interpreted by the receiver. The ultimate aim of communication is to elicit a certain behavioural response from the recipient (Prinsloo in Van Deventer & Kruger, 2009).

Nkwana (2010) is of the opinion that new programmes can be transformed into action through continuous communication between and among the involved parties.

Communication is essential for effective functioning in every part of the organization (schools) and curriculum implementation. Successful implementation of the curriculum depends on the extent to which all consumers are informed and have been prepared for the envisaged change (Nkwana, 2010). Among others leadership also plays a key role in facilitating the communication of curriculum changes. The leadership styles of managers may affect or have an influence on communication of curriculum implementation.(Prinsloo in Van Deventer & Kruger 2009) pointed out that the leadership styles adopted by a leader can have a positive or negative effect in a school and the teaching and learning that takes place in such schools. The type and effectiveness of communication has a direct impact on the school and what should be done.

Consequently, inadequate or poor communication could results in uniformed decision making and poor curriculum implementation. Furthermore, insufficient information may engender misunderstanding, mistrust, frustration, confusion and rivalry in organization (Nyembe Kganye, 2005). The importance of effective and meaningful communication is that it guarantees good results. It is the responsibility of principals as leaders to ensure that there is effective communication in their schools.

Curriculum Responsibilities of School Teacher and Administrators

Teachers know the needs of all stakeholders of teacher education. Teachers can understand the psychology of the learner. Teachers are aware about the teaching methods and teaching strategies. Teachers also play the role as evaluator for the assessment of learning outcomes. So teachers must possess some qualities such as planner, designer, manager, evaluator, researcher, decision maker and administrator. Teachers play the respective role for the each step of curriculum development process. Curriculum planning involves analysis of philosophy, social forces, needs, goals and Objectives, treatment of knowledge, human development, learning process & instruction, and decision (Dimba, 2001).

The author opined that curriculum preparation involves systematic data, content, selection, collection, assessment and organization. Design factors includes school (levels, types, Structures), educational technology, systemic vocational, social reconstruction, Curriculum design, analysis of social needs, translating the needs into Course/general/learning/terminal objectives, splitting the objectives into specific objectives, grouping the specific objectives into subjects, deriving the subjects from the above classification, specifying enabling objectives, unitizing each subject matter, specification of required time, and syllabus formulation. Curriculum development phases consist of instructional development, materials & media development, methods of teaching & testing implementation of the curriculum involves instructional scheme of each subject to be completed in the semester, planning the lessons as per the timetable, using the transactional strategies, using the appropriate media, providing the learning resources, promoting classroom learning experiences, progressive testing curriculum evaluation involves, intra-curricular evaluation, teacher evaluation of students, Student evaluation of teachers, materials evaluation, verification of methods, evaluation of tests and examinations, checking the learning outcomes while on the field, curriculum review/ improvement/ change/ modification and system revision. After evaluating the prepared curriculum and it is observed that the curriculum is not satisfactory then developer turns for revising and improving phase.

While curriculum specialists and outside educational organizations spend time in developing the curriculum, teachers know best what the curriculum should look like. Teachers are the key agents in the curriculum implementation process (Onojerena, 2014).

In Nigeria and South African education system, communication is very often conducted in a top down manner. Such communication is often in the form of a memo, a policy and/or Act. This communication follows certain patterns (Nyambe Kganye, 2005), know as a hierarchy or bureaucratic structure. Upon receipt of information, principals are expected to inform teachers and implement the changes which are communicated as directives. Teachers are responsible for curriculum implementation as they interact directly with the learners in the teaching process, yet they do not have much say in the process of curriculum development and the changes thereafter.

The involvement of teachers in curriculum development is crucial as they are the implementers. A positive and supportive working relationship among the teachers supports the process of implementing curriculum changes. Communication that is based on values, such as trust and open communication, encourages positive interaction between the teachers in implementing the curriculum (Onojerena, 2014). Effective communication facilitates coherence and reduces contradictions in the implementation of curriculum change.

Possible Curriculum Dilemmas

According to Adu and Ngibe, (2014) there are varieties of challenges facing curriculum development, but in general they are classified into three types, global challenges (external), internal challenges of the education systems, and challenges specific to Region. With regard to the external challenges, curriculum planners should response to eight critical processes: the process of globalization, accelerated pace of scientific and technological progress, radical transformation in the work field, increasing social inequalities, progress of democracy and human rights, multi-culturalism, the feeling of insecurity, and moral decline. In addition, the third type of challenges may be summarized as: universal literacy, shortage of highly skilled human resources, reconciling traditional orientation of education with the aspiration for modernity, privatization of schools, diversification of the economy, the need to invest more in education research.

Communication in the Classroom

The Advanced Learner's Dictionary (2010) defines communication as correspondence, a passage or channel, and a means of communication, and giving receiving information. As an organizational activity, communication is the means by which the people in the organization exchange information concerning the environment, operational requirements of supervisors, programme status and ideas of improving organization efficiency (World Bank, 2001). Every communication process in the school involves at least three elements, the sender, the receiver and the message that is transmitted. In the classroom, communication involves the teacher and the learners and the lesson to be transmitted. In any classroom environment, good communication between teacher and learners is very important and this means that the teacher talks, learners listen pattern must be observed. In teaching, the teacher engages in communication when he gives a lecture, a class discussion, explains the content of a lesion, or when he merely gives some signals. A teacher must learn to listen and allow learners to talk and give their view or solutions to classroom problems. The teacher must continuously strive to improve the ability to communicate to his or her learners and also be receptive. Until school managers and teachers communicate effectively, they will not achieve the desired results for which the classroom is meant. There is no doubt that communication is important in the school.

It is another manifestation of the need for coherence. A child will only gain a coherent education if the school functions as a unit, and this means that different parts of the system must receive and transmit information to each other. Communication is thus a coordinating mechanism for various organs or units of the school organization. The executive or the administrator not only has to coordinate the activities of these interdependent parts but also has to obtain feedback from the environment (Husain, 2013). A channel of communication must be established, and this may take time and patience. Although there is the need for structure, excessive structures may create an over formalized system in which personal responsibility is submerged and initiative stifled.

Summary/Conclusion

Effective curriculum management focuses mainly on developing and managing a positive relationship between adults and children. For this to take place, it is essential that all stakeholders in the school system ensure a progressive development of a positive school climate where there is absolute trust, respect and cooperation. This will bring about desirable interrelationship virtues like faith and love in and for one another, healthy competitions and readiness to assume responsibility for one's actions and inactions. For obvious reasons, each institution is expected to have its laid down rules and regulations because what is acceptable in an organization may not work in another.

Communication is therefore, the means through which people in any organization exchange ideas, and information for curriculum implementation. Poor communication could results in uninformed decision making and poor curriculum implementation. Chaos sets in when communication breaks down. The need for coherence and exchange of information between society and the school makes communication inevitable. It aims, among others, to bring social cohesion in the school, enhance public reputation and ensure that curriculum decision making is effective. Communication acts as a co-ordination mechanism for various organs or units. Its importance in the scheme of things should be highlighted. While it senses early internal strains within the school, its absence usually creates an environment of rumours. An open channel of communication is therefore, encouraged.

Recommendations

The curriculum development process can be improved upon by the following ways:

- Need based analysis of curriculum,
  What is the requirement of institutions? Which types of skills are incorporated in the students? How to bridge the gaps between the theory and real life situation?
- Taking feedback of stakeholders is one of curriculum development strategy,
- Use of technology for fulfillment of demands of stakeholders, Revision of curriculum is done for each five years, etc.
- The seminars, panel discussions, orientation programmes and workshops should be arranged for involvement of teacher as curriculum developer
- Curriculum developers should follow some of the principles of curriculum development such as conservative principle, forward looking principle, creation principle, activity principle, child centered principle, flexibility principle, leisure principle, character building principle, and dignity of labour principle. Also the principles of maturity, preparation for

real life, link with life, individual difference, loyalties, core or common subjects, all round development of body, mind and spirit, democracy, secularism, socialism etc.

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ASSESSMENT OF STUDENTS' INTEREST IN CURRICULUM INNOVATION IN SECONDARY SCHOOLS IN MINNA METROPOLIS, NIGER STATE

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Abstract
This study assesses students' interest in curriculum innovation in secondary schools in Minna Metropolis, Niger State. Four research questions guided the study. A survey research design was adopted for the study. Sample of 370 teachers and students from three secondary schools in Minna metropolis Niger state, Nigeria were randomly selected, using simple random sampling technique. Questionnaire titled Secondary School Teachers and Students Curriculum Implementation Questionnaire (SSTSCIQ). The instrument was validated by two curriculum experts from Ibrahim Badamasi Babangida University Lapai, Niger state. Using Crombach Alpha Reliability Coefficient of the following was obtained from the instrument 0.76, 0.84, 0.79 and 0.79. Research questions was answered using simple percentage was used to analyzed research questions. The result shows that 62.2% of the respondent agree with the statement while 37.8% disagree with the statement; in item two, the result shows that 38.4% agreed with the statement while 61.6% disagree with the statement; in item three, the result shows 46.25 agreed with the statement while 53.85 disagree with the statement. Based on the findings, the stakeholder as matter of urgent should organize workshop on way to incorporate teachers and students in curriculum planning. Curriculum changes is needed periodically in order to have positive impact of students' performance and to acquit them of new knowledge Recommendations; Since curriculum is dealing with students' attitude as parts of its element, their interest must be sought through devices such as questionnaire, getting in touch with students representatives such as students union, parents or academic staff union. Also there is need to pilot study of any curriculum innovation to be fully implemented.

Key words: Curriculum, Innovation, Performance, Assessment, Interest

Introduction

Curriculum is often one of the main concern in the educational field. What kind of curricula should we offer to learners? Educators and teachers are concerned about what choices are to make about teaching content and methods. For the parents, they would like to know what children are going to learn. Learners are also concerned about what kinds of content they are going to have in the class. Curriculum seems to be considered greatly as what teachers are going to teach and in other words, what learners are going to learned (Atherton, 2010).

Adebayo (2016) opined curriculum change and innovation as effort made by education authorities to change and adopt their aims and objectives of teaching and learning according to the value, culture, philosophies as well as the resources at their disposal. Students, teaching and learning in secondary schools are all objects and subject of the educational system in Nigeria. Therefore, there is a need to understand any change that may affects the subjects and the need to observe the available objects on ground by the regulating body for the betterment of the whole system. In other words, teachers, students, educational administrators and educational and scientific firms are all stakeholders in education and therefore need to be consulted, involved and informed for any changes and or innovation to take place (Chen, 2007). This is so because education is referred to an act or process of developing and cultivating (whether physically, mentally or morally) ones mental activities or senses; the expansion, strengthening and discipline of one' mind, the forming and regulation of principles and character in order prepare and fit for any culling or business by systematic instructions (Hervey, 2004). The results of these are determined by the knowledge, skills or discipline of character acquired.

The concept of curriculum in education is always changing to suit the need of society. Curriculum can be extended to cover the part of the school curriculum which is not formally stated but which has an effect on the learner's social, intellectual and emotional development, this refers to what is commonly called the hidden curriculum (Hervey, 2004). Education managers should understand the process of curriculum innovation and implementation in order to provide effective professional guidance to teachers under their charge. Gross and Godwin (2005) defined curriculum innovations as the effect made by education authorities to change and adapt their aims and objectives of teaching and learning according to the values, cultures, philosophies as well as the resources at their disposals.

Hervey (2004) identified the following are some reasons for curriculum innovation; the need to provide more relevant education. This can be necessitated by the requirement for various types of schools, such as public, private, community and churches schools which serve stakeholders who have different demands. The need to provide life-long education. The need to provide integrated learning. The need for improved teaching and learning such as introduction of continuous assessment, a learners centered perspective, teachers' resource centers, team teaching and new teaching approaches. Community demand for cost effectiveness in education, for instance, accountability, teacher competence and school calendar and time table.

Gross and Godwin (2005) states that thinking more expensively about stakeholder is easier. Most educators like their ivory tower and many faculty members would rebel at notion of administrators interfering with what goes on in the classroom. Stakeholders is an individuals or entities who stand to gain or lose from the success or failure of a system or an organization, in education they involves students, parents education administrators, employers and community

Aim and Objectives of the Study

The study aimed at investigating students' interest in curriculum innovation in secondary schools in Minna Metropolis, Niger State. Specifically, the study was carried out to;

1. Determine the level of students awareness and involvement about curriculum innovation, planning and implementation
2. Determine the suitability of the curriculum been innovated
3. Find out which direction does innovated curriculum affect the students' performance
4. Determine the position of students as stakeholders in the curriculum planning, innovations and implementation.

Research Questions
The following research questions were raised to guide the study:

1. Is there a need for the student awareness and involvement in curriculum innovation, planning and implementation?
2. Are the students involved in the planning process of the previous curriculum innovation?
3. Have those changes made positive impact on the students' performance?
4. Is there any improvement compare to old curriculum?

Research Question One: Is there a need for the student awareness and involvement in curriculum innovation, planning and implementation?

Table 1: Percentage of Students Awareness, Innovation, Planning and Implementation of Curriculum

S/N	STATEMENT	NUMBER OF YES	% OF YES	NUMBER OF NO	% OF NO
1	The is need for students to be aware of any curriculum innovation of secondary school level prior to its implementation	230	62.2	140	37.8
2	Are students fully informed prior to any curriculum innovation secondary school level prior to its implementation	142	38.4	228	61.6
3	Does secondary school education board formally inform the students in case of curriculum innovation prior to its implementation	171	46.2	199	53.8

From table one, it quest to determine whether the students are aware of curriculum innovations that is taking place at secondary school level. In item one, the result shows that 62.2% of the respondent agree with the statement while 37.8% disagree with the statement; in item two, the result shows that 38.4% agreed with the statement while 61.6% disagree with the statement; in item three, the result shows 46.25 agreed with the statement while 53.85 disagree with the statement.

Research Question Two: Are the students involved in the planning process of the previous curriculum innovation?

Table 2: Percentage of Students involving in the Planning of Previous Curriculum Innovation

S/N	STATEMENT	NUMBER OF YES	% OF YES	NUMBER OF NO	% OF NO
1	Is there any need to involve students in the planning process of curriculum	248	67.0	122	33.0

	innovation at secondary school level				
2	The students don't have the interest to be aware of curriculum innovations at secondary school level prior to its implementation	147	39.7	223	60.3
3	Is Secondary school academic staff union enough to fairly represent both the students and its member in any curriculum innovation stakeholder's debate/meeting?	139	37.6	231	62.4

From table two, it attempt to answer the research questions that seek to determine whether the students are involved in planning process of curriculum innovations. In item one, the result shows that 67.0% of the respondent agree with the statement while 33.0% disagree with the statement; in item two, the result shows that 39.7% agreed with the statement while 60.3% disagree with the statement; and in item three, the result shows 37.6% agreed with the statement while 62.4% disagree with the statement.

Research Question Three: Have those changes made positive impact curriculum on the students' performance?

Table 3:Percentage of Positive Impact of Curriculum on the Students Performance

S/N	STATEMENT	NUMBER OF YES	% OF YES	NUMBER OF NO	% OF NO
1	Does the changes make possible impact on students' performances?	263	71.1	107	28.9
2	Students are fully aware about the curriculum innovation at Secondary school level prior to its implementation.	98	26.5	271	73.2
3	Does the present secondary school curriculum richer than the old curriculum	274	74.1	96	25.9

From table three, the responses attempt to answer the research questions that seek to determine whether those changes made had positive impact on students' performance. In item one, the result shows that 71.1% of the respondent agree with the statement while 28.9% disagree with the statement; in item two, the result shows that 26.5% agreed with the statement while 73.2% disagree with the statement; and in item three, the result shows 74.1% agreed with the statement while 25.9% disagree with the statement.

Research Question Four: Is there any improvement in new curriculum compare to old curriculum?

Table 4: Percentage of New Curriculum Compare to Old Curriculum

S/N	STATEMENT	NUMBER OF YES	% OF YES	NUMBER OF NO	% OF NO
1	Do Nigeria ministry of education debated for or against any innovation in education before fully it implementation.	133	35.9	237	64.1

2	Does the academic staff union of secondary school adequately inform students on any curriculum innovation at secondary school level prior to its implementation	139	37.6	231	62.4
3	Do the ministry wait to see the outcome of an innovated programme before engaging in to re-innovation of just innovated programme especially in Nigerian Secondary schools?	162	43.8	208	56.2

From table four, the responses attempt to answer the research questions that seek to determine whether there is improvement in the innovated curriculum compare to the old curriculum and the state of implementation. In item one, the result shows that 35.9% of the respondent agree with the statement while 64.1% disagree with the statement; in item two, the result shows that 37.6% agreed with the statement while 62.4% disagree with the statement; and in item three, the result shows 43.8 % agreed with the statement while 56.2% disagree with the statement.

Methodology

Descriptive survey was employed to elicit information from teachers and students on curriculum implementation in Minna metropolis Niger state Nigeria. The population of the study comprises 29,564 teachers and students of secondary school. The sample schools have an estimated population of (308)teachers and students (6205). 300 and 70 teachers and students were randomly selected from two secondary schools using random sampling technique. One set of questionnaire was used for data collection, Secondary School Teachers and Students Curriculum Implementation Questionnaire (SSTSCIQ). The instrument contains two sections. Section A is the demographic data of the respondent. Section B contains the items on Curriculum Implementation. The instrument was validated by two curriculum experts. To determine the reliability of the instrument, 203 questionnaires was administered on pilot sample, Crombach Alpha was used to obtained reliability co-efficient of awareness and innovation (0.76), planning process (0.81), students' performance (0.72)old and new curriculum (0.85) and on curriculum implementation. The instrument was administered to 203teachers and students. All 203 copies questionnaire were duly collected and analyzed. The data were analyzed using Yes or No. Simple percentages was used to analyzed all the research questions.

Discussion of Findings

From table one, the table provides answer to the research questions on whether student aware and involve about curriculum innovation, planning and implementation in secondary schools. In item one, the result shows that 62.2% of the respondent agree with the statement while 37.8% disagree with the statement; in item two, the result shows that 38.4% agreed with the statement while 61.6% disagree with the statement; in item three, the result shows 46.25 agreed with the statement while 53.85 disagree with the statement.

Based on the above findings, the result reveals that there is high demand for the students to be aware of curriculum innovations, planning and implementation that is taking place at secondary school level prior to its implementation. It is also revealed that the students are not fully informed on any implantation, also revealed that students are not fully informed on any curriculum innovation at secondary school level prior to its implementation and also revealed that secondary education board do not formally inform the students in curriculum innovation prior to its implementation. The results opposed to the findings of Gross and Godwin (2005) who stated that. stakeholders is an individuals or entities who stand to gain or lose from the success or failure of a system or an organization, in education they involves students, parents education administrators, employers and community.

From table two, the table provides answer to the research questions on whether students involved in the planning process of the previous curriculum innovation. It attempt to answer the research questions that seek to determine whether the students are involved in planning process of curriculum innovations. In item one, the result shows that 67.0% of the respondent agree with the statement while 33.0% disagree with the statement; in item two, the result shows that 39.7% agreed with the statement while 60.3% disagree with the statement; and in item three, the result shows 37.6% agreed with the statement while 62.4% disagree with the statement.

Based on the above findings, the results revealed that there is high demand for students to be involved in the planning process of curriculum innovation at secondary school level. It also revealed that, the students have right and interest to be aware about curriculum change at secondary school level prior to its implementation and lastly the result also revealed that academic staff union of secondary schools alone is not fairly enough to represent both the students and its member's interest in any curriculum innovation. The result therefore, support the findings of Gross and Godwin(2005)which show the need to recognized and incorporate individual such as students, parents or organization within and outside of academic institution.
From table three, the table provides answer to the research questions that seek to determine whether those changes made had positive impact on students' performance. In item one, the result shows that 71.1% of the respondent agree with the statement while 28.9% disagree with the statement; in item two, the result shows that 26.5% agreed with the statement while 73.2% disagree with the statement; and in item three, the result shows 74.1% agreed with the statement while 25.9% disagree with the statement. Based on the finding above, it was observed that the change made in the secondary school curriculum has made positive impact on the students' performance though the students are not fully aware about the innovations prior to its implementation. Hence, this study has proven that the present secondary school syllabus contains more items which reflects Nigeria current need. This is in agreement with Adebayo (2016) statement about curriculum which opined curriculum change and innovation as effort made by education authorities to change and adopt their aims and objectives of teaching and learning according to the value, culture, philosophies as well as the resources at their disposal.

From table four, the table provides answer to the research questions that seek to determine whether there is improvement in the innovated curriculum compare to the old curriculum and the state of implementation. In item one, the result shows that 35.9% of the respondent agree with the statement while 64.1% disagree with the statement; in item two, the result shows that 37.6% agreed with the statement while 62.4% disagree with the statement; and in item three, the result shows 43.8 % agreed with the statement while 56.2% disagree with the statement.
Based on the above findings, the result revealed that the Nigeria Ministry of Education does not debate for or against any innovation in education before its full implementation, the academic

staff of secondary schools does not adequately inform the students on any curriculum innovation at secondary school level prior to its implementation. Also the study revealed that ministry of education do not wait to see the outcome of an innovated curriculum programme before engaging in re-innovation.

Conclusion

The students are not aware about any curriculum innovation at secondary school level prior to its implementation. Students are not involved in planning process of curriculum innovation at secondary school level. The students have the right and interest to be aware of any curriculum innovation at secondary school level prior to its implementation. Nigeria ministry of education does not debate for or against any curriculum innovation before its full implementation.

Recommendations

1. Since curriculum is dealing with students attitude as parts of its element, their interest must be sought through devices such as questionnaire, getting in touch with students representatives such as students union, parents or academic staff union
2. There is need to pilot study of any curriculum innovation to be fully implemented
3. Nigeria ministry of education should organize conference to call for debate for or against curriculum innovation and expert analysis before any attempt to change of add the content of curriculum.
4. Teachers should be able represent students interest when the need arise without bias in the curriculum innovation process

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AN ASSESSMENT OF THE APPLICATION OF PEER GROUP GUIDED INQUIRY IN SOLVING, LEARNING AND RETENTION IN BIOLOGY AMONG SENIOR SECONDARY SCHOOLS IN MINNA METROPOLIS

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Abstract
The study investigated the assessment of applying peer group method in solving, and retention in biology. Two research questions were used to guide the study and two Null hypotheses were used for the study as well. A descriptive research design of the survey type was adopted for the study. The population for the study consists of SSS2 students in selected senior secondary schools. The sample for this study consisted of all SSS2 students in Minna metropolis The research instrument (BAT) were validated by experts in the field of science Education and Education Technology. The instruments used for the study were administered to the respondents by the researcher and research assistants. The responses obtained were analyses using descriptive statistics of frequency counts, percentages, mean, standard deviation and graphs, while the hypotheses postulated were subjected to inferential statistics of Pearson Product Moment Correlation. All the hypotheses were tested at 0.05 level of significance. Based on the above findings, It was recommended that peer teaching technique should as a matter of urgency to allow student to engage themselves and use their energy in the peer teaching process to improve. Also. their understanding of biology as long as they were directly involved in teaching specific material.

Intoduction
Peer-group guided inquiry is a systematic, mediated teaching strategy. Peer-group guided inquiry involves students learning from and with each other in modes which are symbiotically beneficial and involves exchange of ideas, knowledge, experience and skills among colleagues or participants (Crossgrove and Curran,2008). In peer-led guided inquiry learners work together in groups to practice an activity or skills and provide each other with immediate response. The groups of learners can be homogenous or heterogeneous ability or age range. The process involves a variety of instructional strategies which includes; cross-age tutoring (CAT), peer-assisted learning strategies (PALS), reciprocal peer-tutoring (RPT), student teams achievement divisions (STAD), cooperative integrated reading and comprehension (CTRC), teams homes tournaments (TGT), peer-led guided inquiry (PLGI), Jigsaw, Team-Assisted individualization (TAI), simple structures, reverse-role Tutoring and class wide peer-tutoring (CWPT) (Ogunleye, 2010).

Peer-tutoring is however a systematic, peer-mediated teaching strategy. This involves students learning from each other in a way which are mutually beneficial and sharing knowledge, experiences, idea among participants (Prezler *etal* 2007). In peer-tutoring, students work together in groups to practice academic skills and provide each other with immediate feedback. Peer-tutoring is a flexible, peer-mediated strategy that involves student serving as academic tutors and tutees. Usually, higher performing student is paired with a lower performing student to review critical academic or behavioral concept (Prpric and Hadgraft, 2009).

Types of Peer Tutoring

Peer tutoring and peer mediated strategy comprises a variety of instructional strategies (Tracy, 2009).These include:
Cross-Age tutoring (CAT), Peer-Assisted Learning Strategies (PALS), Reciprocal-Peer Tutoring (RPT), Class wide-Peer Tutoring (CWPT), Same-Age Peer tutoring (SAPT)

Class Wide Peer-Tutoring (CWPT): These involve dividing the entire class into two groups of two or five students with different capabilities. These students act as tutors, tutees or both tutors and tutees. CWPT involves highly structured procedure, direct rehearsal competitive terms and posting of scores (Hockings *et al.,* 2008). While the procedure and a routine in CWPT remains the same, students pairing or groups may change weekly or bi-weekly.

Cross-Age Peer-Tutoring: older students are often pair with younger students to teach or review a skill. The older students serve as tutors and the younger student is the tutee. Both the younger and older student can have similar or differing skill level.

Peer-Assisted Learning Strategies (PALS): PALS, a version of the CWPT model involves a teacher pairing students who need additional instruction or help with a peer who can assist in peer assisted learning strategy. Scott and Jennifer(2005), suggested that groups are flexible and change often across a variety of subject area or skills. Students are typically paired with other students who are at the same skill level without a large discrepancy between abilities.

Reciprocal Peer-Tutoring (RPT): two or more students alternate between acting as the tutor and tutee during each session with equitable time in each role. Higher performing students' are often paired with lower performing students. Both group and individual rewards may be earned to motivate and maximize learning.

Same Age Peer tutoring: peers who are within a year or two years of age are paired to review key concepts, students may have similar ability level or a more advanced student can be paired with a less advanced student. Student with similar abilities should have an equal understanding of the content material and concept. When pairing student with different level, the role of tutor and tutee may be alternated, allowing the lower performing student to quiz the higher performing student. The lower achieving student should provide answers when acting as a tutor in order to assist with any deficit in content knowledge.

The Peer-Led Team Learning (PLTL) Model

The PLTL workshop model was developed, in part, to address faculty concerns about student learning and high attrition rates (Quitadamo *et al.,* 2009). A comprehensive report of the research and development work on the model is available (Onwukwe, 2009). The PLTL model addresses the needs of students by providing them with opportunities for interpersonal development as well as a restructuring of their content knowledge. This approach preserves the lecture and introduces a new structure weekly 2-hour workshop where six to eight students interact to solve problems under the guidance of a trained peer leader, a student who has done well in the course previously. Each weekly PLTL work-shop centers on carefully constructed problems and activities. Typically, a course that includes a PLTL workshop consists of 2–3 hours of lecture per week, $1^1/_2$ –2 hours of PLTL workshop per week, and a 3-hour laboratory facilitated by the course instructor. Homework assignments are selected for developing content mastery as well as to prepare for productive participation in the weekly workshops. Peer leaders serve as role models. They are selected because they have recently completed the course, have done well, and have demonstrated good communication and leadership skills. They are enthusiastic and motivated and have the desire to contribute to the learning of their peers. They are catalysts in forming a community of students that can serve as a support group for each other beyond the life of the peer-led team learning.

Based on these aforementioned advantages the researcher saw the need to assess the application of an assessment of the application of peer group guided inquiry in solving, learning and retention in biology among senior secondary schools in Minna metropolis.

Purpose of the Study
This research aim at assessing the application of peer group guided inquiry on the learning outcomes of Biology Students among Selected senior secondary schools in Minna metropolis.

1. To find out the effect of application of peer group guided inquiry on the retention of Biology students among selected senior secondary schools in Minna metropolis.

2. To find out the effect of application of peer group guided inquiry and gender on the motivation of Biology students among selected senior secondary schools in Minna metropolis.

Research Questions
The following research questions were formulated to assess the effect of application of peer group guided inquiry on the learning outcomes of Biology Students among Selected senior secondary schools in Minna metropolis.

1. What is the effect of application of peer group guided inquiry on the retention of Biology students among selected senior secondary schools in Minna metropolis.

2. What is the effect of application of peer group guided inquiry on gender motivation of Biology among selected senior secondary schools in Minna metropolis.

Research Null Hypotheses
The following null hypotheses are tested at $p \leq 0.05$ level of significance

1. There is no significant difference between application of peer group guided inquiry and retention of Biology among senior secondary schools in Minna metropolis

2. There is no significant difference between gender motivation guided inquiry and retention of Biology among selected senior secondary schools in Minna metropolis.

Methodology
This study adopted descriptive research survey. To collect data, a questionnaire was used. The questionnaire solicited for information on assessment of application of peer group guided inquiry on the learning outcomes of Biology Students among Selected senior secondary schools in Minna metropolis. The questionnaire consists of three sections. Respondents were to respond on a four liker scale of strongly agreed, agreed, strongly disagreed, agreed. The questionnaire was given to an expert in the Department of Science

Education Federal University of Technology, Minna, to establish the face and content validity. Population and sample

The population for the study consists of ss2 students in selected senior secondary school in Minna metropolis. Eight co- educational school were purposefully selected for the purpose of the study the total of 1016 were selected using random sampling technique. Copy of questionnaire were minster by the researcher and two research assistance across the eight co-educational schools that were purposefully selected out of the total of 1116 copies of the questionnaire distributed 1008 was returned. The 1008 of the copies of the questionnaire were used for the data analyses of this study.

Data Collection and Analysis
The data collected were analysed using frequency counts, percentage, mean and standard deviation as well as inferential statistics involving Pearson product moment correlation. All the hypotheses were tested at 0.05 level of significance.

Results and Discussion
Results of data analysis are presented in tables and they follow the order in which the research questions were raised.

Hypothesis 1: There is no significant different between application of peer group guided inquiry and retention of Biology among senior secondary schools in Minna metropolis

In testing this hypothesis, data on application of peer group guided inquiry in each of the 8 schools were collected from the responses of the 1008 respondents The result is presented as follow:

Table 1: Correlation between application of peer group guided inquiry and retention of Biology among senior secondary schools

Variables	N	Mean	Std dev	r_{cal}	r_{table}
peer group	1008	75.51	29.57	0.754*	0.591
senior secondary schools	1008	84.89	5.76		

*P<0.05

Table 1 showed the r_{cal} value of 0.754 is greater than r_{table} of 0.591 at 0.05 level of significant. The null hypothesis is rejected. This implies that there is significant different between application of peer group guided inquiry and retention of Biology among senior secondary schools.

Hypothesis 2: There is no significant different between gender motivations guided inquiry and retention of Biology among selected senior secondary schools in Minna metropolis.

In testing this hypothesis, data on gender motivation guided inquiry in each of the 8 schools were collected from the responses of the 1008 respondents/There is no significant different between gender motivation guided inquiry and retention of Biology among senior secondary schools in Minna metropolis. The result is presented as follow:

Table 2: Correlation between gender motivation guided inquiry and retention of Biology among selected senior secondary schools

Variables	N	Mean	Std dev	r_{cal}	r_{table}
Motivation guided	1008	64.14	21.53	0.846*	0.591
Senior secondary schools	1008	84.89	5.76		

*P<0.05

Table 2 showed the r_{cal} value of 0.846 is greater than r_{table} of 0.591 at 0.05 level of significant. The null hypothesis is rejected. This implies that there is significant different between gender motivation guided inquiry and retention of Biology among selected senior secondary schools in Minna metropolis.

Recommendation

It was recommended that peer teaching technique should be used as a matter of urgency to allow student to engage themselves and use their energy in the peer teaching process to improve. Also, their understanding of biology as long as they were directly involved in teaching specific material.

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GENDER PERCEPTION OF THE USE OF ICT FOR CLASSROOM INSTRUCTION AMONG BIOLOGY TEACHERS IN MINNA METROPOLIS OF NIGER STATE

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Abstract

The paper investigated Gender perception of the use of ICT for classroom instruction among Biology Teachers in Minna Metropolis. Research design employed for the purpose of this study was survey research design. The sample size for this study consist of one hundred (100) biology teachers (63 male and 37 female) from all the Secondary Schools in Minna metropolis of Niger State. One research question was raised, The instrument used for data collection was a questionnaire which was designed by the researchers on gender perception of the use of ICT for classroom instruction in biology. The instrument was validated by three experts in biology subject. Pilot study was conducted and reliability coefficient of 0.73 was obtained. The data collected was analyzed using Mean and Standard Deviation. The study reveals that, both male and female biology teachers in Minna metropolis of Niger State have the same perception that, the use of ICT for classroom instruction is an effective instructional strategy. It was recommended among others that Secondary School Teachers should be exposed to various types of Continuous Professional Career Development programs to improve and update their pedagogical skills particularly on the use of ICT for classroom instruction.

Key Words: Biology, Classroom, Computers, Teachers, ICT and Instruction

Introduction

Our society has been undergoing series of changes for the past decades as a result of the knowledge of science and technology. Peoples' culture and ways of life has been modernized as a result of the advancement in the knowledge of science and technology. Advancement in the knowledge of science and technology has brought about the application of Information and Communication Technology (ICT) in our ways of life directly or indirectly. Therefore, Information and Communication Technology (ICT)has gradually become an indispensable part of the contemporary world. This is because our socio-cultural beliefs have been adjusted to meet the changes brought about by the use of Information and Communication Technology (ICT) in our everyday life. These adjustments manifests most especially in areas of medicine, tourism, travel, business, law, banking, engineering and architecture among others. Our ways of life today is vastly different from our fore parents' ways of life in the past decades.

Information and communication technology has no doubt changed the face of teaching and learning globally but in Nigeria, there seems to have a little impact of ICT utilization and far less change as compared to other areas of human life. Though Nigeria is also making efforts to join the ICT fray, these efforts appear to be ineffective (Tettey, 2008: Solomon, 2008 & Meenakshi, 2013).As result of that; stakeholders are calling the government to provide basic facilities including ICT-driven teaching aids for nation's educational system (Adomi & Ppangban, 2010).However, a lot of researchers and educationalists have attempted to explore the use o fInformation and Communication Technology (ICT) during teaching and learning.

Researchers reveal that ICT has immensely contributed to the quality and quantity of teaching, learning and research in traditional and distance education institutions (Adeoye, et al., 2013). It is further revealed that information and communication technology can make the school more efficient and productive, by organizing a variety of tools to enhance and facilitate teachers' professional activities. Adomi and Kpangban (2010) opined that ICT provides opportunities for school to communicate with one another through e-mail, mailing list, chat room and other facilities. It provides quicker and easier access to more extensive and current information. ICT can also be used to do complex tasks as it provides researchers with a steady avenue for the dissemination of research reports and findings.

Ajowi and Simatwa (2010) advanced three major reasons for information and communication technology in education. They, however, suggested that it is a tool for addressing challenges in teaching and learning situation; a change agent; and central force in economic competitiveness. As a tool for addressing challenges in teaching and learning, technology has the capabilities for delivery, management and support of effective teaching and learning. As a change agent, it is capable of changing the content, methods and overall quality and quantity of teaching and learning, thereby reducing teachers' workload and ensuring constructivist inquiry-oriented classroom. Moreover, ICT a central force in economic and social shifts that has technology skill critical to future employment of today's students. Ilomaki (2008) pointed out that the role of technology in teaching and learning is rapidly becoming one of the most important and widely discussed issues in contemporary education policy. Experts in the fields of education have agreed that, if ICT is properly used, holds great promise to improve teaching and learning in addition to shaping work-force opportunities.

The Pedagogical, practices of teachers using ICT can range from only small enhancements of teaching practice using what are essentially traditional methods, to more fundamental changes in their approach to teaching. According to Kiforo(2013) the most effective uses of ICT are those in which the teacher and software can challenge students understanding and thinking, either through whole-class discussions using an interactive whiteboard or through individual or paired work on a computer. If the teacher has the skills to organize and stimulate the ICT-based activity, then both whole class and individual work can be equally effective. ICT can be used to reinforce existing pedagogical practice as well as to change the way teachers and students interact. The use of ICT as representation tools(through overhead and LCD and projectors, televisions, electronic whiteboards, guided "wedtours" where students simultaneously viewed the same resource on computer screens) is seen to be mixed effectiveness. While it may promote class understanding of and discussion about difficult concepts (especially through the display of stimulations) such uses of ICT can re-force traditional pedagogical practice and divert focus from the content of what is being discussed or displayed to the tool being utilized.

The use of ICT for educational purposes has yielded positive result on the part of students such as increased motivation, active learning, efficient retention ability and better access to information. Information and Communications Technology (ICT)or technologies can be seen as a set of information technological tools that can be chosen as supporting educational environment. ICT have necessitated a change in the ways and means of communicating and learning. Computer based resources such as internet, Skype, Emails, mobile phone etc. can be used to deliver, equip and assess learning/teaching materials. The need for ICT in the teaching and learning process in Nigeria is as a result of the necessity to adapt to the ongoing communication technological revolution. The tremendous progress in ICT has brought changes to teaching techniques.

It is one thing to provides schools with ICT and yet another to use them effectively in teaching and learning to realize their impact. Teachers require more knowledge and understanding of ICT as well assist potentialities students' better learning.

Statement of the Research Problem

The lack of ICT-trained teachers in computer to teach practical aspects of computer skills militates against proper utilization of ICT in secondary schools. Large numbers of teachers are not computer literates and such teachers that are not computer literate do find it extremely difficult to deliver appropriately, the education and training required by the information age of the 21st century to their students.

Classroom observation has shown that many secondary schools teachers lack ICT knowledge to be able to apply it (ICT) during classroom instruction. This situation has been a major constraint to making Nigerian educational institutions ICT compliance. Researchers reveals that male teachers are more literate in terms of the use of ICT for classroom instructional at secondary school level of Nigerian education system than their female counterparts but, some are of the view that female teachers are more literate than their male counterparts. On the other hand, some others are of the view that the use of ICT for classroom instruction is gender friendly. From the foregoing it now clear that the use of ICT for classroom instruction is perceived differently by male and female teachers in secondary schools in Nigeria. This study is therefore aimed at determining the gender perception of the use of ICT for classroom instruction among biology teachers in Minna metropolis of Niger State.

Aim and Objectives of the Study

The aim of this study was to determine the gender perception on the use of ICT for classroom instruction among biology teachers in Minna metropolis of Niger State. Specifically, this study strived to achieve one objective which is to determine:

i. The differences in gender perception of the use of ICT for classroom instruction among biology teachers in Minna metropolis of Niger State.

Research Questions

This study raised one research question to guide the study which was answered using mean and standard deviation:

i. What is the difference in gender perception of the use of ICT for classroom instruction among biology teachers in Minna Metropolis of Niger State?

Research Design

Research design employed for the purpose of this study was survey research design. This research design is appropriate since the data comprised of information sourced through the use of questionnaire. Target population for this study comprised of all the biology teachers from the all the Secondary Schools in Minna metropolis of Niger State. The sample size for this study consist of one hundred (100)biology teachers (63 male and 37female)from all the Secondary Schools in Minna metropolis of Niger State.

The instrument used for data collection was a questionnaire which was designed by the researchers on gender perception of the use of ICT for classroom instruction among biology teachers in Minna metropolis of Niger State

The questionnaire consists of two sections (A & B).Section A solicited information about the respondents' bio data while section B consist of questions or items to which the respondent(biology teachers) were expected to respond. A 5-scale (Likert type) item was used. The scales are Strongly Agree (SA) Agree (A) Undecided (UD) Disagree (D)and Strongly Disagree (SD). Each is allocated 5,4,3,2, and 1 mark respectively.

The instrument was validated by three biology experts and an expert from test and measurement unit of Niger State Secondary Schools Education Board, Minna. Their comments corrections and observations were used to produce the final copy of the instrument used for this study. A pilot study was conducted to determine the reliability of the instrument and reliability coefficient of 0.73 was obtained. This indicates that the instrument was highly reliable. The researchers visited the schools used for this study and obtained permission from the school authority to use their schools for research study. The permission was granted and they were introduced to the school biology teachers who were thereafter, given orientation about the research study. On the second visit, the questionnaires were distributed to the biology teachers and after the filling they were all collected back from them without missing any even one. The data collected was later analyzed using mean and standard deviation.

Results and Discussion
Research Question

i. What is the difference in gender perception of the use of ICT for classroom instruction among biology teachers in Minna Metropolis of Niger State?

Table 1: Mean and Standard Deviation for gender perception on the use of ICT for classroom instruction among biology teachers in Minna Metropolis of Niger State

S/N	ITEMS	MEAN	DECISION
1		2.35	Disagree
	As a biology teacher, I see the use of ICT for classroom instruction as a problem responsible for biology students' poor leaning outcomes.	2.30	Disagree

2	As a biology teacher, I prefer traditional method of teaching instead of using ICT for classroom instruction.	2.21	Disagree
		2.38	Disagree
3		3.70	Agree
	The use of ICT for classroom instruction has improved my method of delivering biology lecture in my classroom as a biology teacher	3.90	Agree
4		3.75	Agree
	The use of ICT for classroom instruction has positively influenced my ways of responding to students' questions in when teaching	4.03	Agree
5		1.82	Disagree
	As a biology teacher, I am always afraid of using ICT for classroom instruction during biology teaching.	2.00	Disagree
6		4.02	Agree
	I always use ICT for classroom instruction during teaching because it make teaching and learning more effective and meaningful.	4.32	Agree

7		2.60	Disagree
	My reason for not using ICT for classroom instruction while teaching is because I am not computer literate.	3.59	Agree
8		2.60	Disagree
	The challenge I face while using ICT for classroom instruction is that, I cannot effectively use computer in the classroom.	3.97	Agree
9		3.94	Agree
	I always use ICT for classroom instruction during all the classes because it saves time as compared to the conventional method.	4.49	Agree
10		4.40	Agree
	One of the advantages of using ICT for classroom instruction is that, it makes teaching and learning easier with large class size.	4.05	Agree

The Grand Means and Standard Deviation; Male = 3.36 and Female = 3.27
Table 1 shows the mean and standard deviation of gender perception of the use of ICT for classroom instruction among biology teachers in Minna metropolis of Niger State.

Items1 on the table
Table 1 reveals the mean score of 2.35with standard deviation of 0.08for male and mean score of 2.30 with standard deviation of 0.05 for female. Both means are less than the decision mean of

3.00. This indicates that, both male and female biology teachers in Minna metropolis of Niger State do not see the use of ICT for classroom instruction as a problem.

Items2 on the table

On the second item, the table reveals the mean score of 2.21 with standard deviation of 0.04 for male biology teachers and mean of 2.38 with standard deviation of 0.08 for female biology teachers. Both means cores are less than the decision mean of 3.00. This implies that both male and female biology teachers in Minna metropolis prefer the use of ICT for classroom instruction than traditional method of teaching.

Items 3 on the table

Table 1 reveals the mean score of 3.70with standard deviation of 0.15for male and mean score of 3.90 with standard deviation of 0.18 for female. Both means cores are more than the decision mean of 3.00.This indicates that both male and female biology teachers in Minna metropolis collectively agreed that the use of ICT for classroom instruction has improved their method of biology teaching.

Items 4 on the table

Table 1 reveals the mean score of 3.75with standard deviation of 0.16for male and mean score of 4.03 with standard deviation of 0.09 for female. Both means cores are more than the decision mean of 3.00.This indicates that both male and female biology teachers in Minna metropolis collectively agreed that the use of ICT for classroom instruction has positively influenced their ways of responding to students' questions during biology teaching.

Items 5 on the table

Table 1 reveals the mean score of 1.82with standard deviation of 0.03for male and mean score of 2.00 with standard deviation of 0.03 for female. Both means cores are less than the decision mean of 3.00.This indicates that both male and female biology teachers in Minna metropolis collectively disagreed that they are afraid of using ICT for classroom instruction during biology teaching.

Items 6 on the table

Table 1 reveals the mean score of 4.02with standard deviation of 0.09for male and mean score of 4.32 with standard deviation of 1.01 for female. Both means cores are more than the decision mean of 3.00.This indicates that both male and female biology teachers in Minna metropolis collectively agreed that they use ICT for classroom instruction because it makes teaching and learning of biology more effective and meaningful.

Items 7 on the table

Table 1 reveals the mean score of 2.60with standard deviation of 0.08for male and mean score of 3.59 with standard deviation of 0.15 for female. The mean core of male biology teachers is less than the decision mean of 3.00 while that of the female biology teachers is more than the decision mean of 3.00.This indicates that male teachers in Minna metropolis disagreed with the fact that they are not computer literate hence, they don't use of ICT for classroom instruction while the female teachers on the other hand, agree that they don't use ICT for classroom because they are not computer literate.

Items 8 on the table

Table 1 reveals the mean score of 2.60with standard deviation of 0.08for male and mean score of 3.97with standard deviation of 0.19 for female. The mean core of male teachers is more than the decision mean of 3.00 while that of female biology teachers is less than the decision mean of 3.00.This indicates that male teachers in Minna metropolis disagreed that they face some challenges while using ICT for classroom instruction as a result of their inability to use computer effectively while the female teachers on the other hand agreed to that fact.

Items 9 on the table

Table 1 reveals the mean score of 3.94with standard deviation of 0.19for male and mean score of 4.49with standard deviation of 1.02 for female. Both means cores are more than the decision mean of 3.00.This indicates that both male and female biology teachers in Minna metropolis collectively agreed that they always use ICT for classroom instruction because it saves time as compared to the conventional teaching method.

Items 10 on the table

Table 1 reveals the mean score of 4.40with standard deviation of 1.01for male and mean score of 4.05 with standard deviation of 0.09 for female. Both means cores are more than the decision mean of 3.00.This indicates that both male and female biology teachers in Minna metropolis collectively agreed that the use ICT for classroom instruction makes teaching and learning easier with large class size.

Discussion

i. The study was conducted to determine the gender perception of the use of ICT for classroom instruction among biology teachers in Minna Metropolis of Niger State. Table 1 reveals the cumulative mean score of 3.36 male biology teachers and 3.27 for female biology teachers respectively. This indicates that both male and female biology teachers in Minna metropolis of Niger State have the same perception that, the use of ICT for classroom instruction is an effective instructional strategy. This finding is in line with the findings of Ajowi and Simatwa (2010) as well as the findings of Adomi and Kpangban (2010) who reported that ICT provides opportunity for easier, faster and effective classroom instruction. this outcome negates the findings of Abimbola (2008), that male teachers are more technologically incline that the female counterpart in term of computer usage and orientation. it is also in disagreement with the view of Olalere (2007), that larger numbers of male teachers are not seriously concerned about the integration of ICT into the instructional process.

Conclusion

It can be concluded that both male and female biology teachers in Minna metropolis of Niger State have the same perception of ICT as an effective instruction strategy for teaching biology.

Recommendations

On the basis of the above findings, the following recommendations were made:

i. Government should provide schools with well-equipped computer laboratories
ii. Secondary School Teachers should be exposed to various types of Continuous Professional Career Development programs to improve and update their pedagogical skills particularly on the use of ICT for classroom instruction.

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STATUS OF SCIENCE EDUCATION AND THE CHALLENGES OF I.T CURRICULUM IMPLANTATION IN NIGERIA: MATTER ARISING

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Abstract
In the global context of educational system today, science education is much more than acquisition of scientific facts and skills. It encompasses the development of new ways of thinking, a development that reveals itself in increased skills to tackle problems of life. Hence, motivated by the current pitfalls in the educational system of Nigeria today, the paper accesses the current scenario of science education in Nigerian by evaluating the identifiable factors affecting the implementation of science education curriculum in Nigeria. In doing so, pertinent areas of implementation were reviewed; examination system, available resources, science teachers and science education students etc. and the current status suggests that, until urgent action is taken, the aim of the national policy on science education will remain elusive.

Keyword(s): Science education, curriculum, development, Implementation.

Introduction

In the past few decades, when the foundations of science education were created and injected into the Nigerian school's curriculum, it inculcates abroader context of knowledge production and scientific thinking that are essential to tackle problems of life. It has a special appeal that invokes the idea that is based on universalism, objectivity and rationalism. Unfortunately, the attributes of science education like rationality, creativity, critical thinking and scientific worldviews, which are of universal values have suddenly become elusive in the achievement of national policy on education (Mkpa, 2005). These values are essential for the growth of an individual as well as the society. Afterall, the aim of science education is not just to make learners aware of the scientific facts and concepts but to make people aware of the benefits of using scientific thinking in personal and public life.

Traditionally, curriculum contents of science education are designed to broaden student's scientific knowledge and outlook, but the progressive development of science and technology education as seen today tells a story of a poor process implementation. Methodologically, science is more than a dogma and content driven subject that is pre-dominantly taught in classrooms. It is a process, a method, and a philosophy embedded in the social milieu of the society. The trends in curriculumimplementation with the current status of science education today call for urgent concerns as curriculum content are not being followed systematically, coupled with the problems of inadequate manpower supply for science teachers in schools, inadequate laboratory resource, non-establishment of a Science equipment centre, lack of regular workshops for science teachers and school laboratory technicians all these problem hampered the effective implementation of the new curricula in science and technology education. Therefore, considering the current state of science education in Nigeria, it became pertinent to underlines those factors that has hampered the achievement of those values and further access the state of the current status of science education in Nigeria**.** In this regard, thepaper discusses the current states of science education Nigeria in the context of curriculum implementation and suggest an innovative approach of teaching science education in order to promotes the understanding of science education as a process that help learners to deal the significant problems of their life and inform policy maker on ways for finding a lasting solution to the problems bedevilling the implementation of the current science education curriculum in Nigeria.

Status of Science Educationin Nigeria

In the post independent Nigeria, the constitution adopted the goals of establishing the society based on the scientific temper, humanism and spirit of inquiry, these are further enshrined in the new NPE of 1977 revised in 1981 which led to 6-3-3-4 system of education. Science education policy in Nigeria had been based on the recognition that scientific thinking is the cherished values and yearning of human efforts. It is as precious as society itself for the advancement of society towards social progressivism to achieve the goals of social, moral and spiritual values and material wellbeing (Dare, 2011). Unfortunately, in the recent years, it has been observed that there is a retreat of policy implementation of science education in the public institution which by implication has helped in the downward spiral of the process and further in the culmination of and rise of anti-science attitude in public life (Adebanjo et al., 2008) This poses a great challenge to the educational and economic development of Nigerian. As Onyeachu (2008) pointed out science education is a pivotal instrument of scientific reasoning which every nation must not take with levity hand.

Borrowing from the current scenario, evident abounds to prove the fact that science teaching in Nigeria suffers from problems of lagging behind in achieving enshrined values like scientificreasoning, creativity and increased skills in tackling life problems. On the other hand, the current state of Science education, even at its best, does not encourage inventiveness and creativity, above all overpowering examination system is another fundamental problem of science education in Nigeria. Science education curriculum is full of heavy content which is socially sterile, intellectually boring, and dismissive of student's life (Subedi, 2003). It's no wonder that most students are not able to make meanings out of classroom teaching of science and not able to correlate with what is being taught in the classroom with their personal life. This has proved fatal for the development popularity of science education as a subject among students and promoted the myth of science as a brainy and difficult subject.

According to Ugwu (2006)while lamenting the pathetic condition of the way in which science is being taught in the classrooms in Nigeria"we may take pride in the success of science graduate student abroad, but we have failed to take the question of the seriousness of science teaching and learning in the classrooms". Among other problems is the authoritarian approach of teaching science in Nigeria that hardly allows autonomy to learners and teachers. It adheres to absolute and strict interpretation of textbooks in the classrooms (preponderance of the Textbook Culture).

It is obvious that state of science education in Nigeria is in pathetic condition and the system has failed to reckon with the explosion of knowledge in science. Both Federal and state government policies regarding science education policiesmust act fast and implement the desire policies needed to take science education teaching to the next level.

Challenges of implementing Science education curriculum

Curriculum implementation entails putting into practice the officially prescribed courses of study, syllabuses and subjects that are geared towards achieving the set objectives. The process involves helping the learner acquire knowledge or experience, planned skills, attitudes and ideas which are aimed at enabling them to effectively and optimally succeed in life. The implementation process of science education curriculum will begin with a critical consideration of all means of making it work, this includes learners, resource materials and facilities, the teacher, the school environment, culture and ideology, instructional and laboratory equipment this determines the extent to which curriculum objectives are achieved (Mkpa, 2005). Unfortunately, these factors have hampered the implementation of science education curriculum in Nigeria today, these factors include among others:

Assessment

It is evident that some contents of science educationcourses in Nigerian institutions are too voluminous and thereby creating an overpowering examination system that discourage aspiring students. Science education curriculum is full of some absurd contents which are intellectually boring and play no important role in achieving set objectives. No wonder most students are not able to corelate what is learnt in the classroom teaching of science with the real word. This is a fundamental problem, which potentially can hamper the progressive process of achieving the set goals of prescribed curriculum in Nigeria.

Science examination should able to link the both the theoretical and experimental knowledge to the realities of life thus, this can only be achieved when content on which these assessments are based are narrowed down to a well define and specific objective. This will provide a new standard for students and enhance the achievement set goals. Although the implementation of curriculum is possible in many ways. Nevertheless, it’s advised to consider every possible factor that can affect curriculum implementation in order to develop effective curriculum for education.

Science Teachers

Teachers are the first people to implement their role in the curriculum for their students. They usually select what they need to teach to their students and how it may affect the whole teaching process. Therefore, their curriculum is provided to be alternative as teachers may decide what they want to teach and what they really need to teach. In Nigeria, most science education teachers do not have adequate qualification to teach the ascribe subject. In most cases, teachers are compelled to teach subjects that are not their areas of specialization. This is a serious impediment to curriculum implementation, which demands urgent attention, this is because teachers are the major hub around which the successful implementation of new curriculum revolves. According to Oguntoye (2003), the qualification and experience of teacher as a pre-requisite to the quality of students’ performance. A qualified teacher is a major influencing factor both in student learning and curriculum implementation. Therefore, a qualified science education teacher must be employed in the teaching of science education courses otherwise the problem of effective curriculum implementation will persist in our school system.

Resource Materials and Facilities

It's obvious that no meaningful teaching process can be provided without resources and facilities. This factor enables teachers to significantly deliver effective teaching thereby leading to attainment of behavioural objectives. According to Olokor (2006) who observed that the use of instructional facilities enhances learning experiences and leads to interaction within the learning environment. Today, both federal and state ministry of education has problems providing necessary resources to the all educational institutions in Nigeria. In some schools, science education students have to pay for their laboratory consumables and even supply their schools with necessary equipment. Therefore, the implementation of curriculum is impossible without providing necessary elements for education.

Today, schools in Nigeria are ill-equipped to teach science courses, what is found in most schools in Nigeria are obsolete laboratory equipment, dilapidated building etc. This have a negative effect on effective implementation of school curriculum. The school must be seen as a complete manufacturing organization where plants and equipment must be in a top operational shape to produce result. Ivowi (2004) noted that to ensure that curriculum must be effectively implemented, infrastructural facilities, equipment, tools and materials must be provided sufficiently.

Poor Funding Syndrome:

Research indicators had pointed out that one of the major issues impending the implementation of science education curriculum in Nigeria is the chronic gross under-funding at the all institution of learning in Nigeria. For a meaningful and effective curriculum implementation, there must be massive investment of resources in the form of funds to enhance achieving the desire success. It is noted that the present level of science educating system in Nigeria has witnessed a total stagnation and gradual decay in the system. This affects implementation of a well-designedscience education curriculum. A situation where there is no money for payment of the purchase of equipment, books, furniture and other facilities, the end objectives will surely be undermined.

Application of Information and Communication Technology:

ICT is an integral part of teaching science education today, it has a proven power to be an effective and very useful tool in the teaching of science education and its learning process. Unfortunately, most science education teacher lack the basic skills to apply ICT in teaching,this inadequacy has contributed in militating against effective implementation of science education curriculum in Nigeria. And where the teachers are capable of the application, the facilities are not available. Thus, this has made the institutions to show little concern for the application of ICT in education system and in the long run hampered the effective implementation of science education curriculum.

Matter Arising

With the government new ideas for change andthe call for sustainable socio-economic development due to explosion in information technology that would necessitate the agendas of reforming the science education curriculum, there is the need address those factors affecting curriculum implementation. The aims of science education curriculum reforms have been to help students to develop informed and enriching understanding of science and promote science learning as joyous experience that promote critical and creative thinking through various innovative methods like learning by doing, learning by inquiry method, and discovery method

(Babalola, 2004).). This is the departure from the old ways of knowing science in schools that only inscribes science teaching by giving instructions that students in the classrooms and school followed to mime and mimic the scientific process. The recognition of the fact that scientific knowledge does not only entail knowledge of products of science, but science learning is all about learning processes, cultures and practices of science is important from the educational praxis point of view that emphasizes the bridging the gap between theory and practice. Therefore, it is important to address key issues emanating from the domain of science education teaching and learning.

Cognitive understanding:

The cognitive understanding of science as a dynamic enterprise of human activities is a key factor in any planned science activities, this consist of socio-psycho values that mediates within scientific concepts and helps learner to situate the scientific knowledge in the real context of social world. In the realms of science teaching context today, science activities are narrowed towards the out-of-date procedures that have been known over the decades, a total disconnect with the real world of science today.

Heavy Content of Science Education

The curriculum content pf science education can be consider as being content heavy with more work involved in the learning process more than for other subjects. Equally, the assessment strategy used in science education are particularly too focused on examination and thereby setting too high standard for students. This can potentially create a problem in the implementation process. Science education courses ought to be built on science activity based.

Engaging Innovative activity based

Promoting science education as interesting and fun by capitalising on, and demonstrating, the potential for science education to be interesting, fun and engaging so as to avoid potential negative perceptions of it as boring or difficult. In many institutions of learning in Nigeria, science education activities are not predominantly engaged in innovative activity, most of those activities are either through theoretically or demonstrated in a complete classroom setting. There is a need to look for connections and build upon positive experiences of science education developed earlier on in young people's school careers. It was often noted that young people had enjoyed science at primary school because it appeared to be a fun and appealing subject. Hence, it is important to maintain and extend that interest to encourage student's engagement with the subject. This could be done through science enrichment activities including more practical and group work.

Perspectives on the wider value of science education

Many young studentsalways thought that studying science educationhas no beneficial values for the society, this is because government lay more emphasis on pure and applied science when compare to science education, a development that have contributed to a low percentage of enrolment in schools. Science education is the epitome that is helping the learner acquire knowledge, experience, attitudes and ideas that will enable the learner to succeed in life.

Science education learning does include knowing methods, scientific practices of scientists and nature of science. In other word how does scientific knowledge emerge is important to know for student's comprehensive and deeper understanding of scientific knowledge? These episteme values also include questions like what demarcates science from other way of knowing like religion and philosophy.

Adopting the whole conceptualization of science in accordance with the nature of science can be a good starting point to renew the energy that is needed to review of science education curriculum to get benefit from the pedagogical analysis of teaching science. More particularly the idea of teaching of science and about science extracting from philosophy and methodology of science and science studies may work wonder to kill the symptomatic culture of monolithic way of teaching content of science education.

Way forward

In 1977, when the national policy of education (NPE) was launched and revised in 1981with the aim to connect the development of the nation, citizenship education, and science education. It laid stress on social reconstruction and also on mitigating regional imbalances in the development of educational system. This prioritized the agendas of inclusive education, vocational training, technical and professional education and laid emphasis on enhancing science education in the country. In this way, educational policy was linked to the spread of scientific literacy and scientific awareness in the society that acted to stimulate the different education subsystem to produce skilled workforce needed for economic development. But in this process of production of scientific workforce for the industrial purposes encompasses the darker side. It came as a heavy burden to students at large,textbooks were overloaded with more and more factual information. Reforms were often done on episodic basis to add more information citing the reason like information explosion. This phenomenon and ideology has been analysed by famous Canadian science educator Aikenhead (2006) who has called it the pipeline production.

Science educators, resource groups, and educationists collectively have to come together to challenge the effectiveness of implementing science curriculum in schoolsand formulating approaches that contextualizes science education from the learner's centred perspective. The experiences of other countries in implementing science education curriculum must be borrowed to ensure a changing perspective on science education in Nigeria. Science education stakeholders needs to advocate that Nigeria needs a fresh restart to develop a science education teaching paradigm. Innovative concepts like learning by discovery methods, inquiry method, etc. are not only included in the policy documents at the national level but also emphasized to practice within and outside the classrooms. This must be taken seriously in order to achieve the set objectives of the policy.

Kala & Ramadas(2001) reviewed different trends in science curriculum reforms research that have occurred worldwide. According to them, Piaget's influences in the domain of science education reforms led to a shift from behaviorism to constructivism. Ideas such as theory-laden observations, nature of scientific inquiry should properly impinge into the science education curriculum theories and texts.

Creating enthusiasm among students to learn science education should be a widespread activity in Nigeria. The government should popularize the discipline by means of popular science education articles, organizing lectures, through various scholarship schemes and through the establishment of science education centres etc. Efforts in this direction should come from both government and non-governmental institutions.

Bodies like NERC, CESAC, STAN etc which are actively involved in the development of curricula in science and technology should follow a standard procedure comparable to some developed worlds. New science materials should be innovated, tested and validated then introduce in school system for science teaching.

Conclusion

From the forgoing discourse, it is apparent that numerous challenges characterized the curriculum implementation of science education in Nigeria.Therefore, more effortsare needed from all the stakeholders if we desire to make meaningful progress in the educational system with high quality standard. Curriculum implementation must be given a devoted attention through a systematic mechanism that will ensure it full translation of theory into practice and proposal in action. The understanding of science education as a field concerned with sharing science content, acquisition of scientific facts and skills will help in achieving the primary objective of science education curriculum.

Furthermore, and more importantly,there is increasing importance of applying innovation in teaching science in the classroom that requires teachers creating a real small world of science along with the content of science this must be envisage in the curriculum content in order to augment the issue of non-availability of source materials that are needed in the teaching of science education courses. Also, reforms in science education curriculum that will temper the learner to base their reasoning on the cause-effect relationship should be promoted. In fact, scientific thinking that favors the value-system supported by rational values and promotes the development of the collective conscience of the society based on the spirit of inquiry be injected.

The paper submits that government paper policy is not enough for full implementation of science education curriculum, active efforts on the part of the teacher, students and other stakeholders are needed if the new curriculum will be effectively implemented. To this end, all stakeholders in education sector should live up to expectation by contributing towards achievement of science education objectives.

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ASSESSMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY(ICT) SKILLS AND ACADEMIC QUALIFICATION OF LIBRARY PERSONNEL ON INFORMATION SERVICE DELIVERY IN UNIVERSITY LIBRARY IN OGUN STATE, NIGERIA

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Abstract
The paper Assessed of Information and Communication Technology (ICT)Skills and Academic Qualification of library personnel on Information service delivery in university library in Ogun State, Nigeria. Objectives of the study was to find out the level of ICT skills of Library Personnel, to find out the relationship between Academic qualification and ICT skills of Library personnel and determined the relationship between Information and Communication Technology (ICT) skills and information service delivery of library personnel in the university library in Ogun State, Nigeria. Three research questions and one null hypothesis guided the study. The study adopted survey research design and the population comprised of twenty (20) library personnel in Federal University of Agriculture, Abeokuta. Descriptive statistics was used to analyse the data collected. Findings revealed that the level of ICT skills of the library personnel is high, the library personnel in the university library strongly agreed that there is a relationship between Academic Qualification and ICT skills and the library personnel also agreed that there is a relationship between ICT literacy skills and information service delivery. The null hypothesis tested revealed that there is no significant relationship between Information and Communication Technology (ICT) skills and information service delivery. The study recommended training and re-training of library personnel, provision of resources to the library, competency of the library personnel in the university library in Ogun State as this will help in effective information service delivery to users.

Keywords: Academic Qualification, Assessment, Information and Communication Technology (ICT), Information Service Delivery, Library Personnel, Skills, University Library, Ogun State, Nigeria.

Introduction
University libraries are established to support the university community by providing services that meet with the teaching, research, learning and community development needs of staff and students. They play a key role in the educational system of their parent institutions by providing a variety of services to a wide range of users in the academic environment. Libraries which function as hubs or centres where people come to access resources and interact with others, have taken a quantum leap as it is a growing organism. The modern libraries are being redefined as places to get unrestricted access to information through services to its users and clients. Danner and Pessu (2013) opined that today's fast-paced world is becoming increasingly characterized by technology driven communication, which has transformed the world into a

large global connected community with ever-increasing outreach of Information and Communication Technology(ICT).

The efficacy of information service delivery in libraries cannot be over emphasised as it is the way through which users can have access to unlimited information. Information service delivery is the process of providing services to users and patrons through the resources available in the library. Some of the information services provided in the library include: inter library loan, selective dissemination of information service, reference services, current awareness service, shelving and stock maintenance, cataloguing, classification and indexing and many more.

The advent of Information and Communication Technology (ICT) has however drifted from the traditional information service delivery to the digital Information Service Delivery, thus making delivering to the user faster and more efficient. Information can be searched through different search engines, consortia can be formed to pull resources together and get a good bargain of scale to acquire library software, people from all over the world can gain access to the same information as long as an Internet connection is available. These services cannot be effectively provided to users, if the library staff are not ICT literates.

Information and Communication Technology (ICT) literacy is the ability to use tools of information and communication technology to define one's information problem clearly, evaluate the reliability, authority and bias sources, organize and synthesize one's information with the best ICT tools available in order to use it effectively, and responsibly, as well as communicate one's new ideas effectively and ethically with the appropriate ICT tools available. However, library personnel in this modern age have to be ICT compliant in order to remain relevant, first by acquiring the different ICT skills-from the basic to the advanced level. For the effective ICT competency among the Library staff, the academic qualification of these staff is paramount for proper dissemination of services to users.

Academic qualification is the level of education in a particular discipline of which a proof is given in form of a certificate. Academic qualification of the library personnel cannot be neglected as it plays a major role in the impact of the delivery of services to users. Library personnel in developing countries face particular challenges in providing information literacy skills to enable users to apply information in concrete situations. Library personnel in this digital era must contend with how to manage these resources for optimum use to the benefit of their institutions and in fulfilling their roles as experts in collecting, describing, preserving, and providing stewardship for information resources (Atata*et al.,* 2014).

However, it is important for the library personnel to keep themselves abreast with recent technologies so as to be useful to the library and the community.

Statement of the Research Problem

Libraries manage and disseminate a wide variety of information resources most of which are created outside the walls of their institutions. University libraries in Nigeria provide wide range of services such as reference services; inter library loan, selective dissemination of information service, current awareness service, and indexing and abstracting services. Many of these services are delivered manually and the delivery of these services through traditional means, has been cumbersome and time consuming. Moreover, access to information is limited to print resources and this places the patrons at a disadvantage with limited information resources.

Library personnel need to do so much online these days way beyond basic catalogue and database searching, and be able to use search engines and use them well. Sad enough, most library personnel seem to have the fear of technological advancement, thereby causing restrictions in the use of ICT facilities (Oyedokun, Oyewumi, Akanbi & Laaro 2018).The question is, what could be responsible for this kind of situation? Could it be thatthe library personnelare not sufficiently trained to provide services from the available ones?The need to provide an answer to this question and the likes give rise to this study.

Objectives of the Study

The main objective of the study is to access the Information and Communication Technology (ICT) skills and academic qualification of Library Personnel on information service delivery in University Library in Ogun State, Nigeria. The specific objectives are to:

1. Find out the level of Information and Communication Technology (ICT) skills of library personnel in university library in Ogun State.

2. Find out the relationship between Academic qualification and Information and Communication Technology (ICT) skills of Library personnel in University Library in Ogun State.

3. Determine the relationship between Information and Communication Technology (ICT) skills and information service delivery of library personnel in university library in Ogun State?

Research Questions

The study provided answers to the following research questions:

1. What is the level of Information and Communication Technology (ICT) skills of library personnel in university library in Ogun State?

2. What is the relationship between Academic qualification and Information and Communication Technology (ICT) skills of Library personnel in university library in Ogun State?

3. What is the relationship between Information and Communication Technology (ICT) skills and information service delivery of library personnels in university library in Ogun State?

Hypothesis

One null hypothesis was tested at 0.05 level of significance.

HO_1: There is no significant relationship between Information and Communication Technology (ICT) skills and information service delivery of library personnel in university library in Ogun State, Nigeria.

Methodology

This study adopted survey research design and the population comprised a total of twenty (20) Library personnel in the university library selected for the study in Ogun State, Nigeria. The twenty(20) Library personnel comprises of Professional, Para Professional and Non-Professional Librarians in the various units. The university used was Federal University of Agriculture, Abeokuta, Ogun State. The university is federal owned. Questionnaire was used in data collection. Mean and standard deviation and PPMC were used to analyse research questions and to test the null hypothesis. The purpose of a survey is to collect quantitative information, usually through the use of a structured and standardized questionnaire (Ibrahim, 2013).

Data Analysis

Response Rate

Out of the Twenty (20) copies of questionnaire administered on respondents, 20(100%) were filled and retrieved.

Section A: What is the level of Information and Communication Technology (ICT) Skills of Library Personnels?

Table 1:The Level of ICT Skills of Library Personnel

Statements	VH4	H3	L2	VL1
I use ICT for Internet Navigation	12(60)	8(40)	0	0
I use ICT for Software Installation	7(35)	10(50)	3(15)	0
I use ICT for Library Automation	9(45)	8(40)	2(10)	1(5)
I use ICT for Use of Library Software	8(40)	8(40)	4(20)	0
I use ICT for Software/system development	3(15)	8(40)	8(40)	0
I use ICT for Institutional Repository Management	2(10)	2(10)	4(20)	12(60)

I use ICT for Use of Web 2.0 technologies	4(20)	2(10)	2(10)	12(60)
I use ICT for Networking	3(15)	2(10)	4(20)	11(55)
I use ICT for Website Management	1(5)	3(15)	7(35)	9(45)
I use ICT for System Applications (Ms Word, Excel, Access, SPSS etc)	7(35)	10(50)	3(15)	0
Grand Mean				

Decision mean=2.50

Table 1 revealed that out of the (10) items listed to determine the level of ICT skills of personnel, all the items have a mean score greater than the benchmark mean of 2.50 on a four point Likerscale. These are item 1:I use ICT for Internet Navigation($\bar{X}$=3.60, SD=1.10),item2:I use ICT for Software Installation($\bar{X}$=3.20, SD=0.70),item 3:I use ICT for Library Automation($\bar{X}$=3.25, SD=0.75),item 4:I use ICT for Use of Library Software($\bar{X}$=3.20, SD=0.70),item 5:I use ICT for Software/system development($\bar{X}$=2.60, SD=0.10),item 6:I use ICT for Institutional Repository Management($\bar{X}$=1.70, SD=0.80),item 7:I use ICT for Use of Web 2.0 technologies($\bar{X}$=1.90, SD=0.60),item 8:I use ICT for Networking($\bar{X}$=1.85, SD=0.35),item 9:I use ICT for Website Management($\bar{X}$=1.80, SD=0.70) and item 10:I use ICT for System Applications (Ms Word, Excel, Access, SPSS etc)($\bar{X}$=3.20, SD=0.70)

Section B: What is the relationship Between Academic Qualification and ICT Skills of Library Personnel?

Table 2: Relationship Between Academic Qualification and ICT Skills of Library Personnel

Statements	**SA 4**	**A3**	**D2**	**SD1**	**Mean**
My academic qualification helped me to acquire ICT	12(60)	6(30)	2(10)		3.50

skills.					
I did some ICT literacy courses during my academic programme	9(45)	9(45)	2(10)		3.35
I needed ICT literacy skills to do my assignments, term papers and projects during my academic pursuit	13(65)	5(25)	2(10)		3.55
During my academic pursuit, I was exposed to technologies and its accessories	11(55)	8(40)	1(5)		3.50
I needed ICT skills to pass my examinations during my academic pursuit	6(30)	11(55)	3(15)		3.15
ICT literacy helped me to register as an authentic student during my academic pursuit	7(35)	10(50)	2(10)		3.15
As a student, ICT literacy skills helped me to register the courses I offered	10(50)	6(30)	2(10)		3.20
As a student, ICT literacy skills helped me to view and download my academic results	9(45)	8(40)	2(10)		3.25
Grand Mean					**3.33**

Decision mean=2.50

Table 2 revealed that out of the eight (8) items listed to determine the relationship between academic qualification and ICT Skills of Library Personnel, all the items have a mean score greater than the benchmark mean of 2.50 on a four point Likert scale. These are, item 1: My academic qualification helped me to acquire ICT skills ($\bar{X}$=3.50, SD=1.00),item2: I did some ICT literacy courses during my academic programme ($\bar{X}$=3.35, SD=0.85),item 3: I needed ICT literacy skills to do my assignments, term papers and projects during my academic pursuit ($\bar{X}$=3.55, SD=1.05),item 4: During my academic pursuit, I was exposed to technologies and its accessories ($\bar{X}$=3.50, SD=1.00),item 5: I needed ICT skills to pass my examinations during my academic pursuit ($\bar{X}$=3.15, SD=0.65),item 6: ICT literacy helped me to register as an authentic student during my academic pursuit ($\bar{X}$=3.15, SD=0.65),item 7: As a student, ICT literacy skills helped me to register the courses I offered ($\bar{X}$=3.20, SD=0.70),item 8: As a student, ICT literacy skills helped me to view and download my academic results ($\bar{X}$=3.25, SD=0.75)

Section C: What is the relationship between ICT literacy skills and information service delivery by library personnel?

Table 3: Relationship between ICT literacy skills and information service delivery by library personnel

Statements	SA4	A3	D2	SD1
My ICT literacy skills helped me to render reference service work in the library. E.g. attending to users' queries	10(50)	9(45)	1(5)	0
My ICT literacy skills helped me to render classification and indexing work.	9(45)	9(45)	2(10)	0
My ICT literacy skills helped me to render services in shelving and stock maintenance	6(30)	9(45)	5(25)	0
My ICT literacy skills helped me to render cataloguing work	3(15)	3(15)	6(30)	8(40)
My ICT literacy skills helped me to render work in selective dissemination of information service	7(35)	11(55)	2(10)	0
My ICT literacy skills helped me to render services in inter library loan	5(25)	12(60)	3(15)	0
My ICT literacy skills helped me to carry out current awareness service	8(40)	9(45)	3(15)	0
My ICT literacy skills helped me to use the library management software easily	1(5)	2(10)	5(25)	12(60)
My ICT literacy skills allow me to make use of web 2.0 tools in the library	9(45)	10(50)	1(5)	0

My ICT literacy skills have improved my information search skills	11(55)	8(40)	1(5)	0
My ICT literacy skills have made me to be more efficient	8(40)	10(50)	1(5)	1(5)
Grand Mean				

Decision mean=2.50

Table 3 revealed that out of the (11) items listed to determine the relationship between ICT literacy skills and information service delivery by library personnels, all the items have a mean score greater than the benchmark mean of 2.50 on a four point Likert scale. These are item 1: My ICT literacy skills helped me to render reference service work in the library. E.g. attending to users' queries ($\bar{X}$=3.45, SD=0.95), item2: My ICT literacy skills helped me to render classification and indexing work ($\bar{X}$=3.35, SD=0.85),item 3: My ICT literacy skills helped me to render cataloguing work ($\bar{X}$=3.05, SD=0.55),item 4: My ICT literacy skills helped me to render cataloguing work ($\bar{X}$=2.05, SD=0.45),item 5: My ICT literacy skills helped me to render work in selective dissemination of information service ($\bar{X}$=3.25, SD=0.75),item 6: My ICT literacy skills helped me to render services in inter library loan ($\bar{X}$=3.10, SD=0.60),item 7: My ICT literacy skills helped me to carry out current awareness service ($\bar{X}$=3.25, SD=0.75),item 8: My ICT literacy skills helped me to use the library management software easily ($\bar{X}$=1.60, SD=0.90),item 9:I use ICT for Website Management($\bar{X}$=3.40, SD=0.90), item 10: My ICT literacy skills have improved my information search skills ($\bar{X}$=3.50, SD=1.00) and item 11:I My ICT literacy skills have made me to be more efficient ($\bar{X}$=3.25, SD=0.75)

Hypothesis Testing

H_{01}: There is no significant relationship between Information and Communication Technology (ICT) skills and Information service delivery of library personnel in Federal university of Agriculture, Abeokuta, Ogun State.

Table 4: Relationship Between ICT Skills and Information Service Delivery of Library Personnel

Variable	**N**	**df**	**Mean**	**SD**	**R**	**P**
ICT Skills	20		30.45	4.06		
		19			0.576**	0.05
Information	20		26.65	4.87		

Service Delivery of Library Personnel	

S= Significant at p>0.05

Table 4 showed that the correlation coefficient = 0.576 P> 0.05 that is critical value R 0.576 is greater than P 0.05. Therefore, the null hypothesis which states that there is no significant relationship between Information and Communication Technology (ICT) skills and information service delivery of library personnel in Federal university of Agriculture, Abeokuta, Ogun State Nigeria is rejected. This confirms that increased Information and Communication Technology skills of personnel will improve their information service delivery. This implies that low poor ICT skills will lead to poor information service delivery.

Discussion

This study investigated the Assessment of Information and Communication Technology (ICT) skills and Academic qualification of library personnel on Information service delivery in university library in Ogun State, Nigeria. Three research questions and one null hypothesis were formulated and tested. Responses from research question one revealed that the library personnel had a high level of ICT skills. The study also revealed that the library personnel strongly agreed that there is a relationship between academic qualification and ICT skills.The study revealed that the library personnel agreed that there is a relationship between ICT literacy skills and information service delivery. Nevertheless, the study showed that they had not mastered some software applications with the use of their ICT skills and this has impeded the delivery of services in some areas like cataloguing and library management software.

Conclusion

It can therefore be concluded that the library personnel with their ICT skills and academic qualification can properly deliver information services to their users in the university library in Federal University of Agriculture, Abeokuta, Ogun State.

Recommendations

Based on the findings of the study, the following recommendations were made: -

1. The University library should embark on continuous training and retraining of the library personnels so as to keep updating their ICT skills.
2. Enough resources should be made available by the library so that the library personnel would be able to sharpen their skills in Networking, Website Management.
3. Library personnel who are heads of the units should ensure that the library personnel in the units are competent with their work, with the use of ICT.

INFLUCENCE OF ACCESIBILITY, COMPETENCY AND USE OF ICT ON KNOWLEDGE SHARING AMONG LIBRARIANS AND LIBRARY OFFICERS IN FEDERAL UNIVERSITIES IN NORTH CENTRAL NIGERIA

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Abstract
Information has an important role to play in any academic environment including the university libraries. In view of this crucial role, the academic libraries are also vital to the development of scientific information use and dissemination in Nigeria. Attention must be given to the availability of ICT that could improve knowledge sharing of the staff in academic libraries. However, observation and reports revealed that most of the staff in academic libraries have not developed a high level of interest in sharing their knowledge. The population for this study comprised librarians and library officers in the federal universities in North-Central, Nigeria. There were 254 library staff as at 2017/2018 academic session. Total enumerative sample method was adopted in the study. The research instrument used for the study was "Influence of accessibility, competency and use of (ICT) on knowledge sharing among Library personels in North Central Nigeria. The data collected were analysed using descriptive statistics such as frequency counts, percentages, mean and standard deviation was used to measure research questions, while chi-square was used to test for null hypothesis at 0.5 level of significance.The findings of the study showed that majority of respondents are aware that ICT facilities like computer, internet connectivity, website, and other ICT facilities influence knowledge sharing. Based on the findings, it was recommended among other that the library management should organize seminar for both old and fresh librarians to further create awareness of knowledge sharing among library personnel in North-Central universities library for proper sharing of knowledge.

Keywords: ICT, Knowledge sharing, Library personnel, Accessibility, Competency, North Central, Nigeria.

Introduction
Sharing of knowledge is an interactive practice of disseminating various knowledge to the right people at the right time in intelligible way that allows them to act prudently and to enrich the libraries knowledge base. This is implying that knowledge among librarians could be shared through the use of Information and Communication Technology. Peng, (2010), defined knowledge sharing as a major individual behavior. It is a voluntary, proactive, behavioral awareness; controlled by environmental systems or procedures, such as legal, ethical standards and code of conduct, habits. The result of knowledge sharing knowledge is to be jointly occupied by two or more parties.

Knowledge sharing has for this reason been a key managerial aspect in many information organisations. Ajegbomogun and Diyaolu (2018) observed that Knowledge sharing is a significant aspect of Knowledge Management (KM) which is an important concept of any organisation or library. It aims to explain how to transform personal and organisational information into individual and collective knowledge that may include skills needed in executing the various tasks of a librarian in a library.

Knowledge sharing has gained many attentions from the researchers and this topic has always been discussed as it is the most valuable asset in any library.The major contribution any academic library can make to knowledge sharing is through its information skills, which include: information literacy; creating new knowledge through information filtering, summarising and packaging of information; managing explicit internal and external knowledge; creating indices, taxonomies, thesauri and abstracts. This helps in the facilitation of knowledge-sharing (Sarrafzadeh, Martin Hazeri, 2010).

Statement of the Problem

Information has an important role to play in any academic environment including the university libraries. In view of this crucial role, the academic libraries are also vital to the development of scientific information use and dissemination in Nigeria. Attention must be given to the availability of ICT that could improve knowledge sharing of the staff in academic libraries. However, observation and reports revealed that most of the staff in academic libraries have not developed a high level of interest in sharing their knowledge. This is likely caused by some factors such as enabling working environment, insufficient research training, and self-sponsor to international conferences and others. The inability of some librarians to share their knowledge is likely to encourage low productivity and resulted in dwindling knowledge growth. Also, many academic libraries lack adequate ICT facilities that could influence knowledge sharing among librarians.

Unfortunately, preliminary investigation had shown that librarians have not adequately utilised the modern ICTs platform to share ideas as well as new areas in their field that could be of benefits to them and their students alike. In order to address these issues, the researcher intends to investigate the influence of accessibility, competency and use of Information and communication Technology (ICT) on knowledge sharing among librarians in federal universities in North-Central, Nigeria.

Objectives of the Study

The main objective of this study is to examine the influence of Information and Communication Technology (ICT) on knowledge sharing among librarians in Federal Universities in North-Central Nigeria. The specific objectives are to:

1. find out the influence of awareness of ICT on knowledge sharing among library personnel in Federal Universities North Central Nigeria,
2. identify the methods presently used by library personnel in sharing knowledge among library personnel in Federal Universities North Central Nigeria,

Research Questions

The following research questions will guide the study:

1. What is the awareness of ICT on knowledge sharing among library personnel in Federal Universities North Central Nigeria?

2. What are the methods presently used by library personnel in sharing knowledge among library personnel in Federal Universities in North Central Nigeria?

Hypothesis

The following hypotheses will be tested at 0.05 level of significance.

$H_{01.}$ There is no significant influence of awareness and accessibility to ICT facilities on knowledge sharing among library personnel in Federal University libraries in North Central Nigeria.

Literature Review

To get more insight into knowledge sharing, we need to consider two basic ingredients of knowledge; data and information. Information may be defined as knowledge given or received of some fact or circumstance (Ofori-Dwumfuo NR & Kommey, 2013). Aina (2004) contends that information performs the role of imparting knowledge to an individual, where it reduces uncertainty. Data are raw and unprocessed; information is processed data from which meaning arise and is communicated. Knowledge is believed to be very distinct from data and information. While data, information and knowledge may all be viewed as assets of an organisation, knowledge expresses meaning to an individual and hence tends to be much more valuable. To convert data to information and information to knowledge depends on the experience and analytical abilities of the individual.

There exist two quite distinct, divergent and widely accepted types of knowledge: tacit and explicit. Explicit knowledge is knowledge that has been codified in documents, databases, web pages, etc. or written down and stored on computers. Tacit knowledge is the 'know-how' which is embedded in workers. It is explicit knowledge that most organisations try to capture, acquire, create, leverage, retain, codify, store, transfer, manage and share. According to Burke (2011), knowledge shared with the right intent can benefit all those involved.

Cummings (2009) defined knowledge sharing as information that is provided to help others work together to solve certain problems, develop new ideas and initiatives or implement policies or procedures.

METHODOLOGY

Survey method was used for this study because data was collected in order to describe and interpret the influence of accessibility, competency and use of ICT on knowledge sharing among library personnel in federal universities in North Central, Nigeria.The target population for this study comprised librarians and library officers in the Federal Universities in North-Central, Nigeria. There were 254 library staff as at 2017/2018 academic session.

Data gathered was analysed using descriptive and inferential statistics. The descriptive statistics such as frequency counts, percentages, mean and standard deviation was used to measure demographic characteristics of respondents and research questions 1 to 2, while chi-square was used to test for null hypotheses at 0.5 level of significance. Statistical Package for the Social Sciences (SPSS) version 24 was used for the analysis.

RESULTS AND DISCUSSION

Research Question 1: What is the influence of awareness of ICT on knowledge sharing?

Table 1: Influence of Awareness of ICT on Knowledge Sharing

S/N	ICT FACILITIES	LAFIA		KOGI		NIGER		FCT		BENUE		ILORIN		JOS			
		X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	**X**	**SD**
1.	Computer	3.42	0.90	3.77	0.43	3.67	0.55	3.73	0.46	3.65	0.56	3.25	0.91	3.61	0.56	**3.59**	**0.62**
2.	Scanner	3.62	0.70	3.73	0.63	3.63	0.71	3.73	0.63	3.65	0.69	3.54	0.80	3.52	0.77	**3.63**	**0.70**
3.	Printer	3.38	0.85	3.23	1.07	3.24	0.99	3.23	1.07	3.08	1.09	2.90	0.97	3.32	0.87	**3.20**	**0.99**
4.	Digital camera	3.19	0.90	3.00	0.87	3.09	1.00	2.95	0.95	3.03	1.04	3.06	1.02	3.13	0.92	**3.06**	**1.03**
5.	Facsimile	2.88	0.95	2.59	1.14	2.72	1.02	2.59	1.01	2.77	1.07	3.08	1.03	2.68	0.98	**2.76**	**0.73**
6.	Internet connectivity	3.46	0.90	3.59	0.73	3.63	0.68	3.59	0.73	3.62	0.70	3.62	0.70	3.65	0.66	**3.59**	**0.85**
7.	Website	3.08	1.02	3.50	0.74	3.37	0.83	3.32	0.89	3.38	0.85	3.38	0.85	3.39	0.80	**3.35**	**0.77**
8.	Television	3.12	0.99	3.45	0.60	3.46	0.72	3.36	0.79	3.58	0.70	3.30	0.84	3.48	0.72	**3.39**	**0.88**
9.	Video conference	3.27	0.92	3.27	0.83	3.26	0.89	3.27	0.83	3.27	0.96	3.10	0.91	3.39	0.80	**3.26**	**1.08**
11.	E-mail	3.35	0.94	3.50	0.91	3.31	0.99	3.32	1.04	3.31	1.01	3.22	1.02	3.35	0.95	**3.34**	**1.16**

12.	Fixed telephone	3.31	0.93	2.59	1.22	2.80	1.19	2.45	1.22	2.88	1.24	2.78	1.13	2.81	1.22	**2.80**	**1.10**
13.	CD Rom	3.35	0.89	2.91	1.15	2.96	1.12	2.77	1.23	3.00	1.13	3.08	1.08	3.06	1.12	**3.02**	**0.86**
14	Multimedia projector	3.35	0.89	3.32	0.84	3.33	0.91	3.36	0.79	3.42	0.90	3.38	0.81	3.32	0.91	**3.35**	**0.89**

SOURCE: Author's Field Work (2019)

To find answer to research question 1, table 1 proved helpful. From data collected it shows that most librarians and library officer are aware that computer is the most ICT facilities that influence knowledge sharing with the highest mean score of 3.59 and standard deviation of 0.62. Follow by Internet connectivity with the mean score of 3.59 and standard deviation of 0.85. While the least mean score is X = 2.76, SD = 0.73 and which is facsimile.

Research Question 2: What are the methods presently used by librarians in sharing knowledge among librarians?

Table 2: Methods Presently Used by Librarians in Sharing Knowledge

S/N	STATEMENT	Lafia		Kogi		Niger		FCT		Benue		Ilorin		Jos			
		X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD	**X**	**SD**
1.	Knowledge can be shared through written correspondence or face-to-face interaction	3.62	0.80	3.82	0.39	3.80	0.41	3.82	0.39	3.77	0.43	3.58	0.73	3.74	0.44	**3.74**	**0.51**
2.	Knowledge can be shared through networking with other experts, or documenting	3.38	1.01	3.55	0.74	3.60	0.60	3.45	0.74	3.69	0.47	3.36	0.83	3.42	0.67	**3.49**	**0.72**
3.	Knowledge can be shared through intranet, telephones or emails.	3.19	0.98	3.14	0.89	3.30	0.79	3.05	0.84	3.38	0.70	3.20	0.90	3.23	0.84	**3.21**	**0.85**
4.	Knowledge can be shared through informal meeting rooms	2.88	0.95	2.86	0.99	3.24	0.80	3.00	0.87	3.27	0.87	3.14	0.93	3.23	0.72	**3.09**	**0.88**

SOURCE: Author's Field Work (2019)

Table 2 shows the methods presently used by librarians in sharing knowledge among librarians. The table reveals that the most used method through which knowledge can be shared among librarians is through written correspondence or face-to-face interaction with 3.74 mean score and 0.51 standard deviation. Follow by workshops and seminar (X = 3.57, SD = 0.64). While the least method through which knowledge are shared is through informal meeting rooms with 3.09 as mean score and 0.88 as standard deviation.

Testing of Hypothesis

HO_1 There is no. significant influence of awareness and accessibility to ICT facilities on knowledge sharing among librarians in federal university libraries in North Central Nigeria.

Table 4: significant influence of awareness and accessibility to ICT facilities on knowledge sharing among librarians in federal university libraries in North Central Nigeria

	Value	Df	Sig
Pearson chi square	4.016	1	0.001
Likelihood ratio	3.826		
Linear by linear association	4.015		

a. o cells (0%) have expected count less than 5. The minimum expected count is 134.88.

In response to hypothesis 1, a chi square test was conducted to determine if there was no significance influence of awareness and accessibility to ICT facilities on knowledge sharing among librarians in federal university libraries in North Central Nigeria. The result in the table shows that $X^{2} = 4.02$, $P = 0.001 < 0.005$ which means that the hypothesis is rejected and there was significant influence of awareness and accessibility to ICT facilities on knowledge sharing among librarians in federal university libraries in North Central Nigeria.

Discussion of the finding

The finding of the study showed that majority of respondents are aware that ICT facilities like computer, internet connectivity, website, scanner, multimedia projector, video tape, photocopier and other ICT facilities influence knowledge sharing. The finding of the study is in agreement with Jordan, (2003) who found that ICT facilities available and accessible in library include photocopiers, television, UPS, scanners, satellite dish, projectors, internet connectivity, interactive boards, printers, radio, CD-ROM, and desktops (branded and clone).

The finding of the study also shows that majority of the respondents share knowledge through written correspondence or face-to-face interaction through workshop and seminars, knowledge can be shared through networking with other experts, or documenting, knowledge can shared through intranet, telephones or emails. The finding of the study also in line with Oni, F.A (2010) who discovered that all the libraries surveyed used ICT for serials control as well as other activities use it for knowledge sharing.

The null hypothesis one tested revealed that there was significant influence of awareness and accessibility to ICT facilities on knowledge sharing among library personnel in federal university libraries in North Central Nigeria. This means that when library personnel are aware of ICT facilities, they will be able to access it. The finding is similar to Smith (2003) who confirmed that there is a clear relationship between ICT and knowledge sharing as it makes possible the connections that enable knowledge sharing. Hence, ICT facilities can be seen as enabler of knowledge sharing activities in a library.

Summary of Findings

The summary of findings of the study is presented as follows:

1. Library personnel are highly aware of ICT facilities for knowledge sharing.
2. Majority of the respondent strongly agreed that knowledge can be shared face to face interaction.
3. There is significant influence of awareness and accessibility to ICT facilities on knowledge sharing among library personnel in federal university libraries in North Central Nigeria.

Conclusion And Recommendations

The awareness of ICT facilities such as computer, scanner, printer, digital camera, internet connectivity, website, television, email, CD Rom, multimedia, audio tape, video tape, photocopier etc. influence the method, accessibility and use of the ICT facilities for knowledge sharing.

In view of the findings of the study, the following recommendations are made:

1. Development of an integrated ICT and Knowledge sharing policy framework should be put in place in North-Central universities library for proper sharing of knowledge.
2. The study recommends that adequate fund should be provided to improve and amend infrastructure for sharing knowledge
3. The study recommends that alternative power supply should be provided for better knowledge sharing among library personnel.

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UTILIZATION AND RELEVANCE OF EDUCATIONAL CURRICULUM IN SUSTAINING PEACE AND STABILITY AMONG TEACHERS AND STUDENTS IN NIGERIA

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Abstract

There are many interpretations with regard to the meaning of curriculum. This is why consensus has not been reached among the curriculum educators in respect of its definitions. However, in general terms the word curriculum refers to all that is taught in a school including the time-table subjects and all those aspects of its life that exercise an influence in the life of children. This includes all those other things the child learns sub-consciously, such as, the schools accepted standard of behaviours and values including the hidden curriculum. In hidden curriculum teachers were encouraged being role models for the students to emulate, and cautioned not to practice unaccepted behaviours as it would affect his personality in most of his life endeavours. It is in this respect that the paper examines the relevance of curriculum in sustaining peace and stability among the teachers and students in Nigeria. Finally, among others the paper recommended that the government should emphasise more efforts on the strict implementation of the content of curriculum in the school system by providing enough teaching materials taking care of the teacher's welfare and paying registration fees of students. Teachers and students should try as much as possible to practice the moral values they are learning in the concept of curriculum.

Introduction

The development of any society depends on its level of education. This is why in Nigeria education has long been recognised as a potent tool for national development. Since independence, successive governments have always placed education on their priority agenda. In addition, various national policies and deliberate programmes were introduced aimed at universalising access to education. Also there have been different approaches to the provision of education to ensure quality control in education. However the educational system has to reflect the culture, needs and aspirations of the society for which it is meant for. As such a well-balanced curriculum (which has to do with formal and informal activities) is needed as machinery for achieving the goals of the society. Teachers and students should be considered in the planning and development of the curriculum since they are the interpreting agents of the content of the curriculum. It is in respect of this that the paper discusses the meaning of curriculum, its historical development, its relevance in sustaining peace and stability among teachers and students in Nigeria and finally concluded and suggested some recommendations :-

Meaning of Curriculum

The various interpretations of educators on what students should study in school have invariably brought differences of opinions regarding the definition of curriculum. Therefore, the word curriculum came from word curare meaning "to run" or probably more correctly "to run a course". According to traditionalist, curriculum is defined as a number of fixed subjects or courses with set body of knowledge taught by the teacher and learned by the pupils/students.

Although this definition appears clear and simple, it is however too narrow. Some authors of progressive school of thought viewed curriculum as guided learning experiences. It is not simply a body of knowledge, but a variety of learning activities that students/pupils engage in under the guidance of teachers (Ben Yunusa 2000). Oliver (1977) opined that Curriculum is "the educational programme of school" with attention to the elements of:- programme of studies, programme of experiences, programme of service and hidden curriculum. Curriculum is the formal and informal content and process by which learners acquired skills and alter attitudes appreciations and values under the auspices of that school. (Doll,1978). In other words; Curriculum is a plan or programme for all experiences which the learner encounters under the direction of the school. (Oliver, 1982).

From the above it is clearly observed that the illustrations of some definitions of curriculum which emphasized on two opposing views, that is traditionalist and progressive's school of thought. According to the former, curriculum can be explained in a narrow sense that is, as a programme, it refers to courses of study offered by school, including compulsory and electives or the individual student's curriculum, meaning courses being taken by that student.

On the other hand, the progressive educators recognised curriculum in a broader sense, that is students learn from aspect of the school other than just the course of study or classroom activities. For example, learning of some activities take place in club activities, athletic programmes, guidance programmes etc. So the broad interpretation of curriculum refers to all aspect of the school in which learning takes place. The advantages of this view point is that curriculum can still be described in concrete terms and the recognition that learning takes place in many different settings in the school. But it still has that disadvantage of implying that what are contained are our plans for the various school programmes describes what students actually learn. (Traopfer, *et al*, 1986)

From the above definitions it is understood that curriculum refers to the experiences of the learner that are outcomes of the planned situations. The reason being what is planned is not always what actually happens. The actual curriculum activities are seen in what students gained from various experiences; so a description of the curriculum would be on the resultant fact analysis of the students learning experience. The same explanation goes for teachers planned instructional objectives and what learners achieved at the end of the instructional period. (Troofer, *et al*, 1986)

History of Curriculum Development in Nigeria

Curriculum development refers to the systematic planning, production and use of new practice. For this, therefore in Nigeria the educational system had various forms of curriculum packages at different times. While some packages were modified some had to be discarded, as a result of shifting values and aspiration. In the book "Issues on curriculum" Yunusa M.B.(2000) clearly stated that curriculum development has passed four main periods in Nigeria. These are: period before the advent of the missionaries in 1842, the missionary/Colonial Period (1842 – 1951), period of self government (1952 – 1969) and period of developing a National policy on Education (1969 – 1977). Similarly from 1977 to date many changes are reflected in the system of curriculum of Nigeria with the view of advancing it in order to meet the need and aspirations of the society. (Yunusa, 2000)

The first period of curriculum development in Nigeria deals with the traditional African education whereby the traditional African society had its own form of indigenous education and curriculum before the advent of first missionary society in 1842. There was something to be taught and learnt, in spite of the fact that most of the activities were not written or done in formal system. Pre – colonial Nigerian educational system was simple but it has relevant, diversified and functional curriculum. Its objectives were simple and clear i.e to transmit cultural heritage thereby equip the child with the ability to survive in his society. The traditional Nigerian society which had functionalism as the guiding principles of its education laid emphasis on social responsibility, job creation, political participation, spiritual and moral values. The curriculum content was fluid; it changed from one community to another.

Another curriculum attached to the above is the Islamic systems of education curriculum which is like other forms of education is centred on enabling individuals become the kind of people an Islamic society thinks appropriate for its members. A.M Kusrd is quoted as saying "Along with the inculcation and strengthening of basic values the education system should also aim at training Muslim youth in the correct method of adjusting himself to a changing environment (Yunusa, 2000)

The development of a formal curriculum was begun in 1842 when western education was introduced by the Wesley Methodist led by Rev. Thomas freeman and Mr. and Mrs. William de Craft. Other missionaries such as the church missionary society (CMS, 1848) and the Roman Catholic Mission (1855) followed this lead. These missionaries established schools alongside their churches. In 1882, the British government formally got involved in the education of the natives, their main objectives was only interested in training Clarks and labourers.

Dr. Henry Carr (who was a graduate of mathematics and physics in 1882 from fourth Boy College, Sierra Leone) made tremendous contributions to curriculum development in the elementary, secondary, and training schools. In his 1890 inspection Report he recommended that teachers should be equally trained in content area and in methodology and school management. He encouraged the use of mother tongue as a language of instruction. He was for functional education and deplored the idea of producing clerks in a situation where farmers, fishermen, carpenters and blacksmiths were needed. He proposed the setting up of Government model schools.

Other notable contributions to the development of curriculum in Nigeria during the Colonial era were: Lord Fedrick Lugard who was the Governor-General of the amalgamated southern and Northern protectorates of Nigeria together with his subordinate, their efforts took time to the accepted because the curriculum was based more on Christian religion. The Northern protectorate of Nigeria as at 1914 had at least 25,000 Qur'anic schools with a total pupils population of 218,618 (Fafunwa 1961). Ashby commission made efforts to curriculum development in the area of Higher Education. Its report was instrumental to the establishment of Universities and polytechnics in Nigeria.

In 1969, the Federal Government convened the first National conference on education with membership drawn from all works of life. The outcome of this conference was the National policy on Education in which major policies on education were described. The National policy on Education influenced the development of curricula in pre-vocational courses. It led to the establishment of Educational technology canters where educational resources are produced.

Recently several curriculum development agencies have emerged. These agencies set up minimum standards and ensure their implementation though accreditation. (Taiwo, 1980).

Relevance of curriculum in sustaining peace and stability among teachers and Students in Nigeria

For school system to be well established with full of its benefits to the society there should be effective curriculum content with qualified teachers capable of training others and students who can exercise their talent in the implementation of that curriculum. This is why Smith (1950) defines curriculum as the set or sequence of potential experiences set up in the school for the purpose of disciplining children and youth in group ways of thinking and acting. To smith a curriculum is always in every society, a reflection of what the people think, feel, believe and do.

The above definition emphasized on the role of curriculum in moulding the behaviours of the learners to be disciplined and acquired knowledge in different settings so that they may be useful to themselves and to the community, this will equally enhance peace and stability in the society. It is through this process that the paper discusses the following:-

1. **Curriculum of Indigenous education guide teachers and students towards practicing moral behaviours that will inculcates peace and stability in the society**

Much of the indigenous education is geared towards making an individual to grow up a morally sound and balanced individual. From the time one speak, he is taught how to great his elders and other ways of respect to senior like offering a seat to an elder, not addressing them by their names and so on. The young individuals are made to know those behaviours which are expected of them and point out those that are not expected, like stealing and other unaccepted crimes. Any deviation is usually met with very severe punishment such that the children come to obey any rules made by their parents (Yunusa, 2000). However of the influences of innovations towards the need and aspirations of the Nigerian society those good practices of the indigenous education were neglected. Teachers can play significant role in returning these practices among the learners through class lessons and other non teaching activities. This will enable the two (teachers and students) to respect one another. Thus, peace and stability will emerged.

2. **Hidden curriculum encourages teachers to practice decent behaviours for pupils/students to emulate during the teaching and learning situations.**

Hidden curriculum refers to those things which pupils learn at school because of the way the work of the school is planned and organized but which are not in themselves overtly included in the planning or even the conscious of these responsibilities for the school arrangements. Social roles and attitudes to different aspect of living are leant by pupils in this ways. In the context of hidden curriculum issues are not taught. This untaught, aspect is what hidden curriculum is. Teachers can unconsciously play role which students as acts worthy of emulation. In other words, children copy a lot from their teachers, as they serve as their model. (Urevbu, 1985) Therefore possession of good behaviours by the teachers is of paramount importance. They are always, expected to exhibits good characters which will influence the children to be of a good moral character. They should totally avoid things that would make students/pupils not be discipline as it will cause them to emulate unaccepted characters as a result of which the insecurity will emerged in the society. Odiachi (2010) explained that, security is one of the basic needs of mankind. We know that too much of insecurity in childhood can result to poor mental health, and even neurosis in adult life. Much of our striving in life is for security now and in our old age. Billions are being spent for defence in order that we may feel more secure as a nation.

3. **Formal curriculum assist teachers to feel more secure in the implementation of innovations to the learners**

According to Odiach (2010) Teachers are fearful of giving up practices with which they are familiar with. This is true particularly if they felt secure in using these practices for many years. Individuals who serve in supervision capacity must do everything possible to assist teachers to feel secure in the new situation of learning process. Each case will be different but taking steps similar to the following would be helpful:-

i. Encourage the teacher to change procedure gradually, taking one step at a time.
ii. Help the teacher to evaluate each step taken before moving to the next one.
iii. Assist the teacher to discover the similarly of the old and new procedures.
iv. Sincerely praise each accomplishment
v. Be readily available to render assistance when needed.
vi Let the teacher know that he is not alone in his feeling of insecurity.

4. **Curriculum trains and facilitates the teachers to teach in accordance with Nation philosophy**

A good curriculum focuses mainly on what is enunciated on the National Policy on Education. This embraces the desire for a free and democratic society, a united, strong and self reliance nation, a just and egalitarian society, a great and dynamic nation and a land of bright and full opportunities for all. (NPE 2004) Any deviation from the above philosophical framework entails that the curriculum is fatuity and will cause confusion, insecurity and lack of standard education in the society. This is exactly what is happening presently in Nigeria because majority of the teachers and students deviated from what has been stated in the National Policy on Education. This is one of the major geneses of our suffering in the country. Therefore, a curriculum fashioned on this framework of the National Policy will certainly promote national consciousness, hard work, broadmindedness and problem solving skills. For this, maintaining peace and stability depend on the teacher's ability to properly groom the students in the proper ways.

5. **Civic Education curriculum aimed at integrating history and values of the Nigerian societies**

Civic education for Nigerian primary schools is one of the newly developed subjects in the 9 – year Basic Education curriculum of the Nigerian Education Research and Development Council (NERDC). The subject was derived from the old social studies and citizenship Education. This development stems from the need for the Nigerian child to not only be fully aware of his/her social environment but be informed about his/her position as a citizen of Nigeria. It is also intended to avail the children the instruments for recognizing their rights and responsibilities as citizens of their community and country, and ultimately equip them to work towards becoming better and patriotic citizens (UBE, 2009). This is why civic education curriculum is a welcome development that will inculcate in students national values and consciousness from the foundation level. The national values of honesty, obedience, hard work, tolerance and faith which are germane to stabilising national life are important for determining the development and progress of a nation, as they regulate the life of the nation and good image for the country (NOA, 2008)

6. **Introduction of Basic Education curriculum enables the learners to acquire knowledge of the foundation of education for his benefit and that of the nation.**
   The new Basic Education Curriculum is designed to respond to the ideals of the Millennium Development Goals (MDGs) the goals of Education For All (EFA), as well as the National Economic Empowerment and Development strategy (NEEDS). The Basic Education Curriculum lays a strong foundation for functional numeracy and literacy, basic scientific and technological skills as well as ethical and moral values. The curriculum also incorporates the basic skills of entrepreneurship and life-long learning. (Obioma 2008)

   The curriculum aims at value re-orientation, and the empowerment of pupils through education. The curriculum seeks to enlighten pupils on their social responsibilities in both the family and the community. Therefore, teachers should redouble their efforts in teaching these values to the learners; and should try as much as possible to achieve the objectives as stated in this curriculum.

Conclusion

From what has been discussed in this paper, it is clearly observed that the influence of curriculum toward improving teaching and learning activities among the teachers and students aimed at helping them to understand their obligations in teaching-learning process. This should facilitate and make them to strive to achieve the maximum standard of education that trigger to character modification in the country. Curriculum, teachers and students are three important issues that can never be separated; they go together, and working hand in hand toward achieving educational values in the society.

Recommendations

Looking at the problems highlight in this review the paper is here by recommending the following solutions;

1. The government should put more emphasis on the good implementation of the content of curriculum in the school system, by providing enough teaching materials, taking care of the teacher's welfare and paying registration fees of the students.
2. Teachers and students should try as much as possible to put into practice the moral values that they are learning in the issues of curriculum.
3. Teachers should avoid exhibiting bad behaviours during the implementation of curriculum in the school; they should act in accordance with teacher's ethics, because students copy a lot of things from their doings.
4. It is advisably to the people of the present society that they should go back to the content of the indigenous education curriculum and apply its values to the present children for the purpose of adjusting their misconducts.
5. Teachers should be physically and psychologically balance because they are moulding human beings, they should have good human relations.

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APPLICATION OF SCAFFOLDING TECHNIQUES IN THE IMPROVEMENT OF TEACHING AND LEARNING OF CONTEMPORARY BIOLOGY CONCEPTS

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Abstract
The place of science in the development and fulfilment of the need and aspiration of any country rest on the success of its student in science related field. Since researches have established the improvement of teaching and learning by the application of scaffolding techniques, there is need to extend its application to contemporary biology concepts. This paper helps students meet disciplinary expectations, Provides more opportunities for students to receive formative feedback, Promotes academic integrity, Results in better quality assignments, Based on the above considerations, conclusion; the biology teachers should on regular basis apply an effective method of instruction like scaffolding to enhance better performance and recommendations were made that instructional scaffolding is a formidable and highly effective instructional strategy in the domain of biology. Therefore, for student's achievement in the subject to be improved, biology teachers should imbibe the spirit of regular use of instructional scaffolding in the classroom. Students should on their own establish a sense of competition in the classroom so as to effectively utilize the teacher's instructions through scaffolding.

Introduction
The place of science in the development and fulfilment of the need and aspiration of any country rest on the success of its student in science related field. Advances in science has helped nation promote their efficiency in determination of its citizenry satisfaction of socio-cultural demands in their environment Rowley, N., & Green, G. (2015). Biology is one of the biggest branch of natural science that studies life, thus making it most significant science area to human endeavors. It is a subject that teaches scientific facts relating to living things (Plant and Animal kingdom and their interaction between living and non-living component of the environment, such as theoretical and experimental activities by which human try to find solution to everyday problems (Olatunji 2014).

Also, Sage, (2013) Defines Scaffolding as the process in which teachers model or demonstrate how to solve a problem, and then step back, offering support as needed. Scaffolding is an approach to course and assignment design that involves breaking the learning objectives into manageable steps, and providing instructor support throughout the learning process. The theory behind scaffolding is that when learners first approach a new skill or subject matter, they are able to accomplish much more with support (Bruner, 2012). As they master each step, those supports can gradually be withdrawn, until the learner is able to tackle these tasks completely independently.

CHALLENGES IN TEACHING AND LEARNING BIOILOGY CONCEPT
The lack of adequate skills and experience observed on the part of the students in the operations and application of scientific machines or tools has been blamed on a number of factors. Chidume (2005) and Nwali (2014) laid the blame on the teaching method adopted by the teacher in teaching chemistry and other science subjects. Krill (2009) also blamed it on the

teaching methods, stating that using information communication technology (ICT) in schools would enhance students understanding and also increase skill acquisition in the subject. He also observed that the methods used by the teacher are predominantly teaching oriented methods (like lecture, explanation, demonstration), less teaching and learning-oriented methods like group work, practical work, project activities are rarely learning-oriented methods (like group work, practical work, project activities) are rarely learning-oriented methods like (creative thinking, cooperation, discussion. Ezeudo (2004), Omiko and Ndem (2015) observed that lack of well-equipped science and computer laboratories in schools contribute to low performance of students in the sciences. In the views of Okorie (2003) as cited in Nwali (2014), all the accusing fingers are pointing to the teachers who adopt teacher-centred method of teaching which encourages rote learning strategy. Novak (2005) stressed on the students achievement in science and technology through scaffolding as a heuristic tool for the curriculum. He concluded that the use of instructional scaffolding by teachers for teaching science (chemistry, biology, physics) and computer science instead of rote memorization could change their view of curriculum contents with important implications for teaching and learning. Hartman (2004) noted that the education using the scaffolding makes sure that students become independent and self-regulating learners and problem solvers. Margaret (2005) and Omiko (2013) in their studies saw scaffolding as the assistance (parameters rules or suggestions) a teacher gives to the students in a learning situation. Margaret (2005) added that instructional scaffolding is a learning process designed to promote a deeper level of learning. Scaffolding is the support given during the learning process which is tailored to the needs of the students with the intention of helping the students to achieve their learning objectives. Savery (2006) stated that instructional scaffolding is the provision of support to promote learning when concepts and skills are being first introduced to the students. He further expatiated that these supports may include; resources, a compelling task, templates and guidance on the development of cognitive and social skills. He added that these supports are gradually removed as the students develop autonomous learning strategies, thus promoting their own cognitive, affective and psycho motive learning skills and knowledge.

Juce and Braz (2008) stated that it is best to think of uses of instructional scaffolding in an effective learning environment as one would think of the importance of scaffolding in the support of the construction of a new building or bridge. In education sector, scaffolding can be said to be a help or assistance given to the students or pupils to enable them learn what they want to learn within a period of time. Scaffolding therefore represents the helpful interactions between a teacher and learners that enable the learners to learn something beyond their independent efforts. Alison, (2011) listed the following items as the challenges of teaching Biology concept;

The Content, something that we have an awful lot of and of course this is as much an issue for secondary school teachers as it is for those of us at university. The textbook I use with my classes, Campbell Biology, seems to get thicker with each new edition as the frontiers of our knowledge continue to expand. Ross asks, can we decrease our coverage of content? How do we decide just which are the key content areas for students to learn about? She suggests that we should pay more attention to the research on threshold concepts.

Process*,* this is something I believe all tertiary science educators should ask themselves: do our students really graduate with all the science process skills that we fondly imagine they do?

After all, our graduate profile probably says that they can do x, y, & z – but what opportunities do we give them to actually practice thinking like a scientist, We really do need to teach science as a fluid process, not as a fixed body of knowledge and to give students plenty of opportunity to experience that fluid process that is the essential nature of science.

Inquiry-based learning, something that's intimately linked to process. This is gaining in emphasis in schools & it's worried me for some time that students who've gained by learning using this approach in school must find 'traditional' university teaching rather a rude shock.

Language, There's an awful lot of it. Yes, of course there are technical terms that students must master, but we need to ensure that mastery is properly scaffolded.

Assessment, I could write a whole post, in fact several of them, about assessment. Probably will, at some point. Suffice it for now to say that how we assess has a very significant impact on how, and what, students learn and that we may use too much of the type of assessment that encourages shallow, not deep, thinking and learning and which works against deep conceptual and contextual understanding. **Innovation** – how much do we really value and encourage it, Ross asks. Not innovation for innovation's sake, but innovation for good pedagogical, research-based reasons, that changes how we teach (including assessment) in ways that should have a positive impact on how students learn.

IMPORTANCE OF SCAFFOLDING

Students to become problem solvers

As students transition from receiving direct instruction from the teacher, towards independent problem solving and networking with other classmates, the need for instructional scaffolding is essential if students are to acquire skills that will help them lead their own learning. This work requires individuals to develop into highly interactive, solution-oriented, and effective communicators and contributors, resulting in effective process thinking. This means current classrooms should make available ample opportunities to practice these skills so that students are fully equipped with leadership

Capabilities that align with workplace requirements for interdependency.

Disciplinary expectations

Major assignments such as a literature review, laboratory report, or research essay, require complex skill sets. Not only do students need to know the course material, they must also understand how to write in the appropriate disciplinary genre, select high-quality and relevant sources, and synthesize and evaluate difficult concepts and evidence. Scaffolding these assignments provides greater opportunity for students to attend to the process of completing an assignment, which then helps them to generate a higher quality product.

Opportunities for students to receive formative feedback

Scaffolding allows you and your TAs to provide clear direction and feedback at each learning stage. This means you are more likely to catch problems early on, instead of in a pile of poorly done assignments at the end of the term. Formative feedback during the early stages gives students a chance to learn from their mistakes and a concrete opportunity to correct them.

Academic integrity
Because students must show their work at each stage of a scaffolded assignment, plagiarism is much more difficult. In addition, students tend to be less overwhelmed by a smaller assignment where they have a much better sense of the expectations, which means they have fewer temptations to copy from each other or outside sources. This is especially true when the earlier stages of the assignment are low-stakes and formative.

Better quality assignments
Because scaffolding helps students stay on track right from the beginning, it allows you to ask much more of students and still ensure that the quality of final assignments is much higher. There is extensive research available which shows that scaffolding improves student success. Please see the articles listed below and the bibliography of this publication for further information.

Methods of Scaffolding
The following examples will serve to illustrate a few common scaffolding strategies: The teacher gives students a simplified version of a lesson, assignment, or reading, and then gradually increases the complexity, difficulty, or sophistication over time. To achieve the goals of a particular lesson, the teacher may break up the lesson into a series of mini-lessons that progressively move students toward stronger understanding. For example, a challenging algebra problem may be broken up into several parts that are taught successively. Between each mini-lesson, the teacher checks to see if students have understood the concept, gives them time to practice the equations, and explains how the math skills they are learning will help them solve the more challenging problem (questioning students to check for understanding and giving them time to practice are two common scaffolding strategies). In some cases, the term guided practice may be used to describe this general technique.

The teacher describes or illustrates a concept, problem, or process in multiple ways to ensure understanding. A teacher may orally describe a concept to students, use a slideshow with visual aids such as images and graphics to further explain the idea, ask several students to illustrate the concept on the blackboard, and then provide the students with a reading and writing task that asks them articulate the concept in their own words. This strategy addresses the multiple ways in which students learn—e.g., visually, orally, kinesthetically, etc.—and increases the likelihood that students will understand the concept being taught.

Students are given an exemplar or model of an assignment they will be asked to complete. The teacher describes the exemplar assignment's features and why the specific elements represent high-quality work. The model provides students with a concrete example of the learning goals they are expected to achieve or the product they are expected to produce. Similarly, a teacher may also model a process—for example, a multistep science experiment—so that students can see how it is done before they are asked to do it themselves (teachers may also ask a student to model a process for her classmates). Students are given a vocabulary lesson before they read a difficult text. The teacher reviews the words most likely to give students trouble, using metaphors, analogies, word-image associations, and other strategies to help students understand the meaning of the most difficult words they will encounter in the text. When the students then read the assignment, they will have greater confidence in their reading ability, be more interested in the content, and be more likely to comprehend and remember what they have read. The teacher clearly describes the purpose of a learning activity, the directions students need to follow, and the learning goals they are expected to achieve. The teacher may give students a handout with step-by-step instructions they should follow, or provide the scoring guide or rubric that will be used to evaluate and grade their work. When students know the reason why they are being asked to complete an assignment, and what they will specifically be graded on, they are more likely to understand its importance and be motivated to achieve the learning goals of the assignment. Similarly, if students clearly understand the process they need to follow, they are less likely to experience frustration or give up because they haven't fully understood what they are expected to do. The teacher explicitly describes how the new lesson builds on the knowledge and skills students were taught in a previous lesson. By connecting a new lesson to a lesson the students previously completed, the teacher shows students how the concepts and skills they already learned will help them with the new assignment or project (teachers may describe this general strategy as "building on prior knowledge" or "connecting to prior knowledge"). Similarly, the teacher may also make explicit connections between the lesson and the personal interests and experiences of the students as a way to increase understanding or engagement in the learning process. For example, a history teacher may reference a field trip to a museum during which students learned about a particular artifact related to the lesson at hand. For a more detailed discussion, see relevance.

Conclusion

Instructional scaffolding is a formidable and highly effective instructional strategy in the domain of biology. Therefore, for student's achievement in the subject to be improved, biology teachers should imbibe the spirit of regular use of instructional scaffolding in the classroom. Students should on their own establish a sense of competition in the classroom so as to effectively utilize the teacher's instruction.

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ENHANCING ELECTRICAL/ELECTRONIC TECHNOLOGY CURRICULUM THROUGH PROPER APPLICATION OF INFORMATION AND COMMUNICATION TECHNOLOGY

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Abstract
This study was carried out on how to enhance electrical electronic technology curriculum in colleges of education in Oyo State. The study adopted survey research design. The population of the study was 144 electrical electronic technology supervisor in both private and public establishments in Oyo State. The population of the study was purposively adopted as sample. The instrument for data collection was a 100 item questionnaire which was developed by the researcher. The instrument was duly validated by three experts, one from test and measurement, one from vocational and technical education and one from science and computer education all in Nnamdi Azikwe University, Awka. Two Research question guided the study while the two null hypotheses were tested at 0.05 level of significance using t-test statistic. The reliability co-efficient of 0.69 using Cronbach. Based on the findings the contents of curriculum in college of education electrical electronics technology are relevant to train the electrical electronics technology students, the findings also discovered that electrical electronics technology jobs performed by the electrical electronics technology graduate in the workshop or café or establishment as technician or workshop attendants are adequate. Based on the findings recommendations were made that the educator and curriculum planners should work closely with establishments to develop current content for schools among others.

Introduction
There is no doubt that there is a powerful link between education and human capital formation and thus between education and development. Kumar and Ahmad (2012) posited that true education should be a purposive, conscious or unconscious, psychological, sociological, scientific and philosophical process which brings about the development of the individual to the fullest extent and also the maximum development of society in such a way that both enjoy maximum happiness and prosperity. It is a well recognized and acclaimed statement that education is the most potent instrument for development mental and social emancipation.

Education is seen as the process of acquiring skills, knowledge and experience which will help an individual to perform better in a society (Karim, 2015).

According to Ifejika (1990) curriculum is the totality of the experiences which the learner has acquired under the direction of the school for the purpose of effective desirable patterns of behaviour. Indeed curriculum is a concept which explains what happens in school in the course of education. For Beauchamp (1978) curriculum is the total learning, planned or unplanned, explicit or implicit intended or unintended, that learners gain from exposure to instruction.

The term technology is simply defined by the United Nations Educational Scientific and Culture Organization (UNESCO) (1985) as the know-how and creative processes that may assert people to utilize tools, resources and systems to solve problems and to enhance control over the natural and man-made environment in an endeavour to improve the human conditions.

Solomon (2010) defines technology as the systematic application of all sources of organized knowledge.

Electrical/electronics technology are courses designed by federal government of Nigeria as appeared on the Nigeria Certificate in Education (NCE) Minimum Standards for vocational and Technical Education (FRN 2013). Electrical/Electronic Technology discover cool gadget to make every day life so much easier with simple tools of which majority of these gadget are powered with electricity with either alternating current (a.c) or direct current (d.c).

Colleges of Education was established to produce teachers of high quality, inter alia, the laying down of minimum standards for all programmes of teacher education. The field of technological education has been affected by information technology network which have undoubtedly affected teaching, learning and research activities (Yusuf, 2005). A great deal of research has proven the benefits to the quality of technical education (Al-Ansari, 2006). In a rapidly changing world, basic education is essential for an individual to access and apply information, such ability that must be found include information technologies in the global village.

Information Communication Technology (ICT) according to Emuakpor (2002) is all forms of technology applied to the processing, storing and transmitting information in electronics form; stressing that the physical equipment used for this purpose includes computers, communication equipment and networks, fax machine and electronic simple instruments. Ayo (2001) view the ICT as the use of computer system and telecommunication equipment in information handling consisting of essentially three basic components viz. Electronic processing using computer transmission of information using telecommunication equipment and dissemination of multimedia.

For the purpose of this study, proper application of information technology in electrical/electronics education is rightful use of computers and telecommunication equipment in storing, retrieving and transmitting of information in the teaching and learning process of electrical electronics education. It becomes explicit from the above that information and communication technology (ICT) in electrical/electronic technology education comprises all the electric infrastructure and facilities employed by electrical/electronics technology educators provide and improve efficient services to beneficiaries in electrical/electronics technology education. Such facilities in broad term, consist of hardware, software and communication lines between the service outlets of different electronics technology education to facilitate the sharing of common resources for the beneficiaries.

Statement of the Problem

The primary objectives of electrical/electronic technology in the colleges of education is to produce a high quality teacher or technician who will be able to transmit the learning skill and solve the related electrical electronic technology problems in any establishment. It has been observed that graduates of Electrical/Electronics technology employed upon graduation cannot perform as expected, that most recent applications or electronic softwares are hardly come by during their training and therefore not competent to handle such.

Today's operations programme in electronics most realistically reflect the new development that are altering present programme technique. If one accept vocational competence, as a primary objective of electrical/electronics technology at colleges of education, then how relevant are the curriculum contents to today's world of work? in other world these are the types of electronic programme or activities in the classroom related to real-life in electrical/electronics tasks performed in present electronics establishment workshop or ICT cyber café? Does the present content of electrical electronics technology which student learn at the colleges of education level equip them with relevant marketable skills? Thus what can we do to enhance electrical/electronic technology curriculum probably through ICT to make the colleges of education fit-into the world of work.

Purpose of the Study

The main purpose of this study was to enhance electrical/electronics technology curriculum through proper application of information and communication technology in colleges of education. Specifically the study sought to determine:

1. The contents of electrical/electronics technology curriculum that are relevant in working with present communication application.
2. The electronics/electrical jobs performed by college of education graduate in electrical /electronics workshop or ICT centre.
3. The jobs performed by the graduates of electrical/electronics in electric workshop or ICT centre.

Research Question

The following research questions guided the study.

1. What contents of electrical electronics technology curriculum in colleges of education are relevant in working with present communication application?
2. What are the electrical electronics job performed by colleges electrical electronics graduates in the workshop or café.
3. What are the jobs need to perform by the graduates of college of education in electrical/electronics workshop or Cyber café?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

H_{01}: There is no significant difference between the mean ratings of male and female electrical electronics technology supervisors regarding the contents in electrical electronics technology for Colleges of Education curriculum that are needed for obtaining electrical electronics skills development in south-west part of Nigeria.

H_{02}: Male and female electrical /electronic supervisor do not differ significantly in their mean ratings on the electrical/electronic jobs performed by graduates of electrical/electronics technology in colleges of education.

Method

A survey research design was adopted for the study. In line with Abonyin (2011) the survey design focuses on people, their beliefs opinions, attitudes, motivation and behavior.

The study was carried out in both private and public establishments in Oyo State. The researcher chose Oyo state because the state has a concentration of establishment needed for the study.

The population of the study was 144 electrical /electronics supervisors in 64 establishments for the area of study. The instrument for data collection was a 100 item questionnaire which was developed by the researcher. The questionnaire was structured on a four (4) point rating scale of Very Relevant (VR), Relevant (R), Slightly Relevant (SR) and Not Relevant (NR).

The instrument was validated by three experts, one expert from department of technology and vocational education one from science and computer education department and one from measurement and evaluation department all in Nnamdi Azikiwe Univeristy, Awka. The instrument yielded a reliability coefficient of 0.69 which indicated that the instrument was reliable. The researcher administered the questionnaire to the respondents personally with help of ten research assistants who are properly briefed on the purpose of the research.

Mean and standard deviation were used to answer the research questions while the hypotheses were tested at 0.05 level of significance using t-test. The decision rule for answering the research question was based on the upper and lower limits of the mean thus very relevant (3.50-4.00), Relevant (2.50-3.49), Slightly Relevant (1.50-2.49) and Not relevant (1.00-1.49). for the hypotheses, if the calculated t-value was equal to or greater than the critical value the null hypothesis was rejected, otherwise it was retained.

Results

What contents of electrical electronics technology curriculum in colleges of education are relevant in obtaining electrical electronics skill in the workshop or cafe.

Table 1:

Mean ratings of respondents to the contents of electrical electronics technology curriculum in colleges of education that are relevant to electrical skills development in the workshop or cyber-café.

S/N	Contents of electrical electronics technology	X	SD	Remark
1	Making identification of electronics component	2.77	1.09	Relevant
2	Making readings of value of the component	2.94	1.04	Relevant
3	Categories capacitors	2.76	1.01	Relevant
4	Identifying capacitors value	2.73	1.01	Relevant
5	Test and determine the condition of capacitor	2.77	0.89	Relevant
6	Charge the capacitor	3.06	0.93	Relevant
7	Identify the transistors	2.86	0.94	Relevant
8	Categorize transistor to unipolar/bipolar	2.91	0.95	Relevant
9	Check the inventory list	1.77	0.97	Slightly Relevant
10	Keep the inventory book	1.77	0.98	Slightly Relevant
11	Classification of transistors into A, AB, B or C	2.74	0.91	Relevant
12	Checking the reading instrument	3.10	0.80	Relevant
13	Preparing the oscilloscope for the job	1.69	0.86	Slightly relevant
14	Recondition the cell of the battens	1.63	0.80	Slightly relevant
15	Preparing electrolyte	2.71	1.01	Relevant
16	Maintenance of tools, instrument and equipment	1.67	0.80	Slightly relevant

17	Keep safe of electronics tools gadget instrument	2.42	0.99	Slightly relevant
18	Check the entrance of the workshop	1.57	0.75	Not relevant
19	Identifying the condition thyristor	2.10	0.97	Slightly relevant
20	Identifying resistors	2.63	1.08	Relevant
21	Identifying colour coding for the value	2.42	0.99	Relevant
22	Check all the jointing of the circuit	3.18	0.94	Relevant
23	Tin the mouth of the soldering iron	2.81	0.95	Relevant
24	Check all the terminals of the faulty appliance	3.26	0.84	Relevant
25	Trouble shoot the faulty electronics appliance	2.15	0.85	Slightly Relevant
26	Dignonese through the use of osulloscope	3.28	0.98	Relevant
27	Utilize modern trouble shooting appliance	2.02	0.83	Slightly relevant
28	Calculate the appropriate power rating	3.22	0.87	Relevant
29	Observe the input and output of the appliance	2.53	0.89	Relevant
30	Cross-check the flow of the network in the circuit	3.34	0.83	Relevant
31	Cross-check the flow of current in the circuit	3.86	0.84	Relevant
32	Assemble the components to perform a designated duty	3.21	0.84	Relevant
33	Identifying the bridge network	2.10	0.86	Slightly relevant
34	Calculate the value of current and voltage consumed	2.33	0.87	Slightly relevant
35	Check the power requires by an appliance	1.69	0.90	Slightly relevant
36	Check the performance of a repaired appliance	2.49	0.88	Slightly relevant
37	Identifying the manufacture of appliance	3.42	0.67	Very Relevant
38	Reporting the condition of electronic appliances	2.01	0.84	Slightly relevant
39	Preparing the report on all faculty appliance	2.16	0.85	Slightly relevant
40	Preparing report on the availability of alternating current	2.21	0.82	Slightly relevant
41	Preparing manufacturing report on appliance	3.46	0.67	Relevant
42	Identifying source of power on appliance	2.27	0.85	Slightly relevant
43	Identifying source of leakage or outage power fault	1.99	0.82	Slightly relevant
44	Tracing the loss of signal in electronic appliance	2.85	0.11	Relevant
45.	Rectifying the communication gadget	2.00	0.78	Slightly relevant
46	Verifying the voltage stabilizer	3.46	0.53	Very relevant
47	Rectifying the fluctuating voltage	2.98	0.90	Relevant
48	Trouble shooting the handset phone	2.95	0.84	Relevant
49	Trouble shooting the screening of a computer	2.01	0.91	Slightly relevant
50	Trouble shooting the software	2.03	0.79	Slightly relevant
	GRAND MEAN	2.56		

Table 1 shows that the content area in electrical electronically electronics technology curriculum listed were curriculum listed were considered relevant by the respondent except items number18, 21 items is slightly relevant, to 2 items is very relevant

Research Question 2

What are the skills/jobs performed by electrical electronics technology graduate in electrical electronics workshop or café in Oyo State?

Table 2: Mean ratings of respondents on the electrical electronics technology skill or job performed by electrical electronics technology graduates in the workshop or cyber-cafe

S/N	Electrical electronics jobs/skilled performed by	$\bar{X}$	SD	Remark

	electrical electronics technology graduates			
51	Making identification of electronics component	3.22	0.92	Relevant
52	Test and determine the condition of capacitors	2.63	1.08	Relevant
53	Identifying capacitors value	2.71	1.00	Relevant
54	Categories capacitors	2.76	0.93	Relevant
55	Read and value the electronics component	2.72	0.89	Relevant
56	Charge and identifying the polarity of capacitors	3.35	0.80	Relevant
57	Identifying the transistors	2.76	0.80	Relevant
58	Categorizes The Transistor To Uniportar/Biportar	2.28	0.86	Relevant
59	Check the inventory list	2.35	0.86	Slightly relevant
60	Keep the inventory book	1.88	0.01	Slightly relevant
61	Check the entrance of workshop	1.76	0.94	Not relevant
62	Classification of transistors into A, AB, B or C	3.10	0.89	Relevant
63	Preparing the oscilloscope for the job	3.26	0.91	Relevant
64	Recondition the cell of the batteries	3.26	0.88	Relevant
65	Preparing electrolyte	1.69	0.82	Slightly relevant
66	Maintenance of tools, instruments and equipment	3.22	0.92	Relevant
67	Keep-safe of electronic tools, gadget & instrument	2.18	0.99	Slightly relevant
68	Clearing the circuitry system of electronic appliance	2.74	0.81	Slightly relevant
69	Identifying the condition of thyristor	2.74	0.81	Relevant
70	Identify resistor	3.17	0.91	Relevant
71	Identify colour code of resistors	2.74	0.81	Relevant
72	Check the jointing of the circuitry system	1.69	0.89	Slightly relevant
73	Try the mouth of electric soldering iron	2.01	1.02	Slightly relevant
74	Check all the terminals of faculty electric appliances	3.10	0.98	Relevant
75	Troubleshoot the faulty electronics gadget	3.04	1.05	Relevant
76	Diagnose through the use of electroscope	3.10	0.98	Relevant
77	Utilize modem troubleshooting appliance	1.60	0.81	Slightly Relevant
78	Calculate the appropriate power rating of appliance	3.14	0.98	Relevant
79	Observe the input and output of the appliance	3.17	0.91	Relevant
80	Cross-check the flow of network in the circuit	3.34	0.84	Relevant
81	Cross-check the flow of current in the circuit	3.86	0.86	Relevant
82	Assemble the component to perform designated duty	1.74	0.86	Slightly Relevant
83	Identifying the bridge circuit	1.68	0.82	Slightly Relevant
84	Calculate the value of current and voltage consumed	2.51	0.85	Relevant
85	Playing the musical instrument	1.62	0.88	Not Relevant
86	Check the performance of repaired appliance	1.69	0.85	Relevant
87	Identifying the manufacturing of appliance	2.66	0.93	Slightly Relevant
88	Prepare the task list	2.66	0.93	Relevant
89	Preparing the report on faulty appliance	2.13	0.90	Slightly Relevant`
90	Sign-out after the work	1.556	0.74	Not Relevant
91	Preparing report on availability of alternating current	3.24	0.92	Relevant
92	Maintain periodic workshop maintenance	3.26	0.93	Relevant
93	Identifying source of power in appliance	2.42	1.00	Slightly Relevant
94	Tracing the loss of signal in electronic appliance	3.23	0.94	Relevant
95	Rectifying the communication gadget	1.66	0.83	Slightly Relevant
96	Verifying the voltage stabilizer	1.98	0.83	Slightly Relevant
97	Keep record of faulty appliance	3.22	0.90	Relevant

98	Send telegram	1.58	0.74	Not Relevant
99	Self electronics appliance	1.84	0.97	Slightly Relevant
100	Obtain manual information	1.63	0.84	Not Relevant
	Grand Relevant	2.50		Relevant

Table 2 shows that five items were not relevant. 15 items were slightly relevant while 32 items were relevant. The grand mean indicate that jobs performed by electrical electronics technology graduates in the electrical electronic workshops or café were relevant.

Testing of hypothesis

H_{o1}: There is no significant difference between the mean rating of male and female electrical electronics technology supervisors to the contents of college of education curriculum that are needed for obtaining electrical electronics technician in the workshop.

Table 3

t-test analysis of means ratings of electrical electronics supervisors on the contents of College of Education electrical electronics curriculum relevant in producing technicians for electrical/electronics workshops.

Sex	N	$\bar{X}$	SD	Df	t-cal	t-crit	Decision
Male	90	2.61	092				
				142	0.95	1.96	retain H_o
Female	54	2.45	1.01				

Table 3 shows that the calculated t-value 0.95, dff 142; and t df = 1.96 level of significance and 142 degree of freedom is 0.95 while the critical t-value under the same conditions 1.96. Since the calculated value of t is less than the critical t-value, the null hypothesis is therefore retained. This means that there is no significant difference between the mean ratings of male and female electrical electronic technology supervisors regarding their opinions on the content areas of colleges of education electrical electronic technology curriculum that are relevant in the workshop or cyber-café.

H_o: There is no significant difference between the mean ratings of male and female electrical electronic technology supervisor regarding the electrical electronic technology jobs performed by college of education electrical electronic technology graduates in workshop or café in Oyo State.

Table 4

t-test analysis of mean ratings of electrical electronic technology supervisors on the jobs performed by college of education electrical electronics technology graduates in workshop or cyber-café

Electrical Electronics technology Supervisor	N	$\bar{X}$	SD	df	t-cal	t-cri	Decision
Male	90	2.31	0.97				
				142	0.76	1.96	Retain

Female	54	2.43	0..88

Table 4 above shows that the calculated t-value of 0.96 and t diff = 1.96 and 142 degree of freedom t-cal while the calculated t-value under the same conditions is 0.76 while the critical t-value under the same conditions is 1.96. Since the calculated t-value is less. Than the table t-value, the null hypothesis is therefore retained.

This means that no significant difference exists between the mean finding of male and female electrical electronic technology supervisors regarding the electrical electronics technology by college of education electrical electronic technology graduates in the workshop or café in Oyo State.

1. The contents of electrical electronics technology are relevant in training for electrical electronics technician in Oyo State

2. The electrical electronic technology jobs preformed by college of education electrical electronics technology graduates in Oyo State Colleges of Education included electrical electronics worship technician, as well as electrical electronic as workshop attendants or café manager.

3. There is no significant difference between the mean ratings of male and female electrical electronics technology supervisors to the contents of electrical electronics technology curriculum relevant to the training electrical/electronics technology technicians or workshop attendants.

4. There is no significant difference between the mean rating of male and female electrical/electronic technology supervisors to the skill acquired in electrical electronic technology for graduates in workshop or cyber-café in Oyo State.

Discussion of the findings

1. Data in table 1 revealed that the respondent were in agreement with majority of the professionally qualified technicians or workshop attendants

2. Data shown in Table 2, revealed that respondents were of the view that colleges of education offering electrical/electronic technology to graduates employed in workshop or cyber-café in Oyo State perform better than the electrical electronics technician.

Conclusion

Colleges of education using curriculum of electrical electronic technology prepares the students for job performed by college of education. Majority of the contents were relevant for advancing in establishment or factory in Oyo State. Therefore, college of education training electrical electronic technology graduates employed in establishment of factory in Oyo State perform better than the electrical electronics technicians jobs expected of them.

Recommendations

1. Educators and curriculum planners should work closely with establishments to provide current curricula content.

2. Electrical electronic lecturers should be given the opportunity to work in establishment or factory during any vacations or breaks to enables them to be up-to-date in knowledge.

3. College of education the electrical electronics lecturer should continue to inspire students to develop interest in electrical electronic technology, establish or pursue the electrical electronics career to the higher degree level.

4. The electrical electronics technology curriculum should not only be geared towards theory development.

5. Everyday an electrical electronics technology problem should be made part of classroom discussion.

6. Contemporary issues on electrical electronics technology should be a point of deliberation in the classroom.

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EFFECT OF 7ES MODEL OF CONSTRUCTIVIST INSTRUCTIONAL STRATEGY ON INTEREST OF STUDENTS IN SECONDARY SCHOOL BIOLOGY IN KOGI STATE

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Abstract
This study investigated the effects of 7Es model of constructivist instructional strategy on interest of students in secondary school biology in Kogi East Education Zone in 2012/2013 academic session. The design used for the study was a quasi-experimental design. two objectives, two research questions and two hypotheses guided the study. The instruments used for the study was Biology Interest Scale (BIS). The reliability coefficient obtained during the pilot study using Cronbach Alpha formulae for BIS instruments was 0.82 respectively. The population of the study was all the 19,240 senior secondary two students in 147 co-educational schools in both rural and urban areas. Three hundred and thirteen senior secondary two students were selected by stratified random sampling technique for the study. BIS instrument was validated and administered to the students in their intact classes. Mean and Standard Deviation statistical tools were used to answer the research questions while Analysis of co-variance (ANCOVA) was used for testing of the hypotheses at 0.05 level of confidence. The findings revealed that 7Es constructivist instructional strategy significantly enhanced interest at ($F=12.12$, $P<0.05$) more than conventional method among students in biology. There was no significant difference in the interest at $F(1,162) = 0.12$, $P < 0.05$ between male and female students taught using 7Es model constructivist instructional strategy in biology. It is recommended, among other things that biology teachers should use more inquiry based strategies like the 7Es model of constructivist instructional strategy to enhance interest of students in biology.

Keywords: 7Es model Constructivist Instructional Strategy, Conventional method, Interest, Gender

Introduction

The roles of science and technology in human lives cannot be over-emphasized. These roles span over a wide range of areas such s transportation, agriculture, communication and health care delivery among other things can be used to provide man's basic needs such as food, clean water, shelter, energy, health care, clothing and education. Science deals with the acquisition of knowledge through step by step observation collection of data for analysis to get a precise result. Science according to Okeke (2010) is a systematic process of obtaining verifiable and testable knowledge about nature and natural occurrences utilizing careful observations and experiments. She also defined technology as a practical application of science in solution of problems encountered in the environment. Science and technology are therefore, verifiable tools for socio-economic development of modern society. Technology is the application of scientific principle and knowledge to production. Ekemode (2010) says science is the "know why" while technology is the "know how". He further adds that science produces knowledge while technology produces wealth. Sarojini, (2005) defined biology as a branch of science that involves the study of living things. Living things can be classified into two broad groups, namely plants and animals. Some of the branches of biology include: genetics, cytology, anatomy, morphology, entomology and parasitology, among other things. The subject finds application in other disciplines like agriculture, medicine and so forth. Presently, it is recognized as a standard subject of instruction in schools all over the world. In spite of the popularity of biology among students, the failure rate has remained high and achievement has been poor. This has been attributed to factors like inadequate instructional facilities and teachers' use of inappropriate teaching methods for teaching the subject among other things (Bettina, 2005; Isah, 2007; Anthony, 2010; Alexander, 2012).

Samba, Achor and Ogbeba (2010) have called for the use of innovative teaching strategies like constructivist instructional strategy to science teaching. Constructivism is a philosophy of learning founded on the premise that by reflecting on our experiences we construct our own understanding of the world we live in. It is a broad term used by philosophers, curriculum designers, psychologists and educators to emphasize learners' contribution to learning through both individual and social activity (Woolfolk, 2008).

According to Piaget (1977), the guiding principles of constructivism which science educators recommend to be applied in science classrooms include the following: Learning is a search for meaning. Therefore learners must be helped to construct meaning from issues. Learning requires understanding whole as well as parts and not isolated facts. In order to teach well, teachers must understand mental models that students use to perceive the world and the assumptions they make to support these models (Ryder, 2010). By these principles, the purpose of learning is for an individual to construct his or her own meaning and not to just memorize and regurgitate someone else's meaning (Akinloye, 2002; Okebukola, 2002). In other words, learners take responsibility for their own learning, thereby fostering, among other things, learners' acquisition of problem solving skills and ability to express ideas based on the understanding of such concepts.

Also, the principles of constructivism discourage teacher's domination of classroom and encourage teachers' use of open-ended questions among other things. One unique advantage of constructivism principles is that it calls for elimination of grades and standardized testing in science. By this, assessment becomes a part of the learning process, so that learners play a greater role in determining their own progress in science classroom. There are two constructivist schools of thought namely social constructivism and cognitive constructivism.

Social constructivists emphasize the influence of cultural and social contexts in science learning. They advocate for teachers' use of discovery model of learning in science classrooms (Woolfolk, 2008). The use of the discovery model thus places the teacher in an active role while the students' mental abilities develop naturally through various paths of discovery. One of such discovery models of teaching is the 7Es model of constructivist instructional strategy. The 7Es model involves conducting learners through a cycle of seven stages of learning activities. The stages of activities include: excitement, engagement, exploration, explanation, elaboration, evaluation, and extension. Each stage of learning is aimed at achieving an objective in the learners (Eisenkraft, 2003).

On the other hand, cognitive constructivists such as Piaget, (1977) and Von Glasersfeld (1989) posit that a child constructs understanding through many channels in his or her environment. Some principles guiding the cognitive constructivist theory include; learning as an active process, learning in terms of holistic approach and learning as constructing meaning based on learners' experiences. By these principles, leading cognitive constructivist psychologists like Piaget and

Bruner (1968) emphasized that there was the need for instructional materials to be relevant to the learner's cognitive development. These cognitive psychologists stressed the need for science curriculum that was organized in a spiral manner so that students could continually build upon what they had already learned. The need for spiral curriculum is necessitated by the adoption of an eccentric pattern for science subjects' curricula; including the biology curriculum in secondary schools in Nigeria.

The choice of a teaching method should be considered in terms of enhancing learners' interest. This is so because the level of interest of a student in a subject whether high or low can either enhance or mar a student's career prospects. Ryder (2010) defined interest as arousing or inducing the attention or curiosity in a person. It also means wanting to know or the feeling that one wants to know or learn more.

The concept of interest in relation to classroom teaching and learning has been one of the concerns of educators and psychologists in recent years. Cognitive theorist such as Piaget (1977) outlined stages of cognitive development of a child into four namely sensory, pre-operational, operational and concrete stages. A child's response to stimuli in his environment differs in each of these stages. Cognitive psychologists such as Piaget and Brunner (1968) have called for the use of instructional materials that are relevant to learners' cognitive level. This implies that teachers should use learning materials and methods that appeal to learners' interest based on their cognitive level. By this theory, there is need to employ the 7Es model of constructivist instructional strategy whether it will foster students' interest in biology lessons.

An issue of concern in education is the possible influence of gender on learning outcomes like students' interest. In a report by the West African Examination Council's Senior School Certificate Examination (2001-2011), statistics of results in Nigeria by subject, grade and sex revealed low enrolment due to low interest among girls for science subjects. Thus, against this backdrop, there is the need to undertake this study to determine the effect of 7Es model of constructivist instructional strategy on interest among students in biology with respect to gender in senior secondary schools in Kogi East Education Zone in Nigeria.

Statement of the Problem

Biology is taught as a compulsory subject in secondary schools because of its importance to several disciplines including medicine and agriculture in Nigeria. The subject content consists of concepts that require both theoretical and practical applications. Both theoretical and practical aspects of the course content demand that biology be taught with methods that require minds-on and hands-on activity. That is, methods that are inquiry based.

The need for more efficient approaches in teaching science subjects like biology has been the concern of educators like Samba and Eriba (2012) in recent years. This concern is as a result of inability of biology teachers to use inquiry based methods in teaching biology. This leads to poor interest among students in biology in Nigeria. This is evident in studies by Mbajiorgu (2003), Isah (2007) and in the Chief Examiner's report of West African Senior School Certificate report between 2001- 2011. Thus, the problem of this study stated as a question is: what are the effects of 7Es model of constructivist strategy on interest of students in secondary school biology in Kogi East Education Zone?

Purpose of the Study

The study investigated the effects of 7Es model of constructivist instructional strategy on students' achievement and interest in biology in senior secondary schools. Specifically, the study was guided by the following objectives.

1. Investigate the effect of 7Es model of constructivist instructional strategy and conventional method on interest in biology among SSII students.

2. Find out the effect of 7Es model of constructivist instructional strategy on interest in biology among SSII students based on gender.

Research Questions

The following research questions guided the study.

1. How does 7Es model of constructivist instructional strategy and conventional method affect interest of students in biology?

2. What is the effect of 7Es model of constructivist instructional strategy on interest of students in biology based on gender?

Hypotheses

The study was guided by the following hypotheses.

$Ho_{:1}$ There is no significant difference between the mean interest scores of the students' taught biology using 7Es model of constructivist instructional method and conventional method.

$Ho_{2:}$ There is no significant difference between mean interest scores of male and female students taught biology using 7Es model of constructivist instructional strategy.

Methods

The study was aquasi-experimental one. Specifically, non-equivalent control group design was used. The population of the study was all the 19,240(10,524 male and 8,716 female) senior secondary two students from the 147 co-educational schools in Kogi East Education Zone for 2012/2013 academic session (Kogi State Ministry of Education, Lokoja, 2013).

Simple random sampling techniques were used to select 313 students (152 males and 161 females) from eight schools in the area of study. The instrument used for the study was a Biology Interest Scale (BIS), a Likert type scale was designed by the researcher to obtain students' feelings or views about topics in biology that were used in the study and students' views on biology as a subject. The first fifteen BIS items focus on students' views on biology as a subject. The second fifteen items of the BIS inventory were drawn from the four selected topics in SSII biology syllabus. The topic includes balanced diet, excretion, pollution and erosion. The topics were used because they are topics in biology SS II syllabus. The BIS items were thirty in all.

The BIS was expected to elicit responses based on the views of the students on assigned points of 5, 4, 3, 2, and 1 on five-category theme; strongly agree (SA), agree (A), undecided (U), disagree (D) and strongly disagree (SD). Thus, a maximum of 150 score and minimum of 30 scores could be obtained on responses to interest inventory. Three experts in science education validated the instrument. A pilot test was conducted in two schools outside the area of study and are liability index of 0.82was obtained using Cronbach Alpha formular.

Method of Data Collection

First, the researcher under-took a training workshop using a training instructional guide for the eight research assistants who were graduate biology teachers in each selected school for two days. On the first day of the workshop, the researcher instructed the four research assistants for control schools to conduct rehearsal on the use of lesson plans on conventional method in teaching selected topics in biology. While the second day of the workshop was used to train the other four research assistants for experimental schools on the use of lesson plans on 7Es model constructivist strategy in teaching selected topics in biology.

Secondly, all students that were involved in the study were pre-tested using BIS instrument. There was no prior lesson taught to treatment and control groups before the pre-testing. The results of the pre-BIS scores were collated before the actual treatment began.

The third phase involved teaching selected topics in biology with 7Es model constructivist instructional strategy to the treatment groups. The same topics were taught with conventional approach to the control groups. Both treatment and control groups were taught with different modes of lesson plans for four weeks. Both treatment and control groups were post-tested using BIS instrument after four weeks of teaching. The post-BIS ratings were collated like those of pre- BIS. These were then subjected to statistical analysis.

Results

The research questions were answered using means and standard deviation while the hypotheses were tested at 0.05 level of significance using analysis of co-variance. The data are presented and analyzed according to the research questions and hypotheses.

Research Question 1

How does 7Es model of constructivist instructional strategy and conventional method affect interest of students in biology?

Data answering research question two is presented in Table 1

Table 1**: Mean and Standard Deviation of Pre-test and Post-test Interest scores for Conventional and 7Es groups**

Group		Pretest	Posttest	Mean difference
Conventional group	N	148	148	
	$\overline{X}$	2.95	2.97	0.02
	SD	0.37	0.34	
7Es group	N	165	165	
	$\overline{X}$	3.21	3.54	0.33
	SD	0.42	0.41	
Mean difference				0.31

Table 1 shows that the students in the 7Es group had a mean interest score gain of 0.33 while those in the conventional group had a mean interest score gain of 0.02. This shows that the students in the 7Es group scored higher than conventional group with a difference of 0.31. Thus, interest was enhanced for students taught biology with 7Es model of constructivist instructional strategy than those taught biology with conventional method.

Research Question 2
What effect will 7Es model of constructivist instructional strategy have on interest of male and female students' in biology?

Data answering research question four is presented in Table 2

Table 2: Mean and Standard Deviation of Pre-test and Post-test Interest scores of Male and Female Students in the 7Es group

Sex		Pretest	Posttest	Mean difference
Male	N	80	80	
	$\overline{X}$	3.20	3.53	0.33
	SD	.441	.400	
Female	N	85	85	
	$\overline{X}$	3.23	3.55	0.32
	SD	3.21	3.54	
Mean difference				0.01

Table 2 shows that the male students had a mean interest score gain of 0.32 while the females had a mean gain of 0.33. This shows that the female students scored higher than their male counterparts with a difference 0.01. Hence, the use of 7Es constructivist instructional strategy fosters interest of females than males in biology.

Test of Hypotheses
Analysis of Covariance (ANCOVA) was used to test the significance of the differences between the mean scores in hypotheses 1-2. Also, the F-values were tested at 0.05 level of significance.

Hypothesis 1: There is no significant difference between the mean interest scores of the students taught biology using 7Es model of constructivist instructional method and those taught using conventional method.
The test of hypothesis is presented in Table 3

Table 3: (ANCOVA) of Mean Interest Scores of Students Exposed to 7Es and Conventional methods

Source	Type III Sum of Square	df	Mean Square	F-ratio	Sig.	Decision
Corrected Model	32.73[a]	4	8.18	68.80	.00	(S)
Intercept	20.39	1	20.39	171.37	.00	
Pre-test	8.18	1	8.18	68.80	.00	
Method	14.41	1	14.41	12.12	.00	
Gender	0.03	1	0.03	0.28	.87	
Method * Gender	0.01	1	0.01	0.12	.73	
Error	36.64	308	0.12			
Total	3428.36	313				
Corrected Total	69.4	312				

a. R Squared= .472 (Adjusted R Squared=.465)

Table 3 shows that the calculated F-ratio is significant. F (1,308) = 12.12, P<0.05. Therefore, the null hypothesis is rejected. There is a significant difference between the mean interest scores of students taught biology using 7Es constructivist instructional strategy and conventional method. As such, interest was enhanced in students taught biology using 7Es constructivist instructional strategy than conventional method.

Hypothesis 2 There is no significant difference between mean interest scores of male and female students taught biology using 7Es model of constructivist instructional strategy.

The test of hypothesis is presented in Table

Table 4: ANCOVA of Mean Interest Scores of Male and Female Students Exposed to 7Es

Source	Type III Sum of Square	df	Mean Square	F-ratio	Sig.	Decision
Corrected Model	3.44[a]	2	1.72	11.48	.00	(S)
Intercept	16.82	1	16.82	112.26	.00	
Pre-test	3.41	1	3.41	22.75	.00	
Gender	0.19	1	0.19	0.12	.73	
Error	24.27	162	0.15			
Total	2096.41	165				
Corrected Total	27.71	164				

a. R Squared= .124 (Adjusted R Squared=.113

Table4 shows that the calculated F-ratio is not significant, F (1,162) = 0.12, P<0.05. Therefore, the null hypothesis is not rejected. There is no significant difference between the mean interest scores of male and female students taught biology using 7Es constructivist instructional strategy. Hence, interest was enhanced in both male and female students taught biology using 7Es constructivist instructional strategy.

Discussion of Findings

The study investigated the effect of 7Es model of constructivist instructional strategy on interest of students in biology in senior secondary schools. The discussion is based on the analysis and findings of the research questions and hypotheses.

Effect of 7Es constructivist instructional strategy and conventional method on students' interest in biology

Table 1 shows that the observed difference between the mean interest score of students in the 7Es group and those in the conventional group is 0.31. This shows that the students in the 7Es group scored higher than conventional group. Table 2 shows that at F (1,308)=12.12, P<0.05, there is a significant difference between the mean interest scores of students taught biology using 7Es model of constructivist instructional strategy and conventional method.

Previous study by (Mbajiorgu, 2003) reveals that students do not show interest in biology because of teachers' poor approach in teaching the subjects. This makes biology lesson boring and uninteresting. More often, students complain that the subject is too wide and involves a lot of note taking. This study has confirmed findings with previous study by Kim (2005) that the use of constructivist instructional strategy fosters interest of learners than conventional method in biology. Students showed greater interest when taught with 7Es model constructivist instructional strategy than conventional method because they were allowed to observe real problems like erosion, malnutrition and pollution, investigate and proffer solution to these problems.

Effect of 7Es constructivist instructional strategy on male and female students' interest in biology

Table 2 reveals that the female students had a higher mean interest gain thanmale students. The observed mean difference in interest between female and male is 0.01. Table 4 shows that at F (1,162) = 0.12, P<0.05, there is no significant difference between the mean interest scores of female and male students taught biology using 7Es model of constructivist instructional strategy.

Biology is one of the science subjects made compulsory in secondary schools in Nigeria. Like other science subjects, students' interest in biology has not been encouraging over the years. This has been blamed on several factors including teachers' use of in-appropriate teaching methods (Nwagbo, 2001; Isah, 2007). The high mean interest scores of male and female students in this study shows that use of 7Es model of constructivist teaching strategy which is inquiry-based fosters interest among male and female in biology. This finding is in agreement with findings in previous studies by Mbajiorgu (2003) and Kim (2005) that the use of inquiry teaching strategies fosters students' interest in male and female students in science subjects. Students' interest were enhanced because they were exposed to diverse activities like visiting sites of problems related to the topics in biology lessons, investigate the causes of the problems and proffer solutions to the problems observed.

Conclusion

The following conclusions were made in this study.

i. 7Es model of constructivist instructional strategy significantly fosters students' interest more than conventional method in biology.
ii. 7Es model of constructivist instructional strategy fosters interest of both male and female students in biology.

Recommendations

On the basis of the findings of this study, the following recommendations are made.

1. Science teachers should intensify the use 7Es model of constructivist instructional strategy in teaching since it involves the use of diverse activities such as role-play, discussion and small group work among other things, should be used in biology lessons to stimulate and sustain students' interest.

2. There is need biology teachers to teach biology without being gender bias. And this can be achieved through the use of all gender friendly activity-based strategies such as the 7Es model of constructivist instructional strategy that can stimulate students' interest in biology.

3. There is need for biology teachers to help students develop interest in biology and other science subjects. This is because the use of inquiry-based teaching strategies like 7Es model of constructivist instructional strategy requires the use of activities like discussion and small group work that can stimulate students' interest in biology.

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CURRICULUM OF MATHEMATICS EDUCATION; PROBLEMS AND PROSPECTS

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Abstract
Mathematics education like most other subjects had been confronted with several challenges. These challenges have been making it difficult for the overall goals and objectives of teaching mathematics in our schools to be fully achieved. This paper examined the problems facing Mathematics' Curriculum. The paper took a look at each of the problems alongside with their causes. The objectives of Mathematics as slated in the National Curriculum were highlighted. The paper recommended among others that specialists in Mathematics should be employed to teach the subject and periodic Workshop and Seminars should be organised for Mathematics teachers to improve their efficiency.

Keywords: *Curriculum, Mathematics, Education, Problems and Prospect.*

Introduction

Education is regarded as the most important tool of development as it imparts in the successive generations of knowledge, skills and attitudes for personal and societal development. Education according to Ajayi, (2007) is defined as the acquisition of knowledge, skills, habit and attitude of positive value which makes an individual to function positively and effectively in his environment. The Federal Government of Nigeria (2008) in the National Policy on Education described education as an important instrument of change (FRN, 2018). Education is a systematic course of instructions, giving intellectual and moral training to persons, bringing up the young, helping them to develop, to lead out the best in them, and to evolve and integrated personality (Enoch, 1996).

Mathematics has been identified as an indispensable subject in many fields; Amazigo (2000) opined that a basic Mathematics education for all children is not a luxury but absolute necessity. Mathematics is predominantly a service subject because it produces skills that should be used in other areas of endeavour like science, technology, business, medicine, humanity, e.t.c.

The growing needs in these areas place a burden on the subject - mathematics to be properly taught and understood by the learners. In line with available curriculum for basic mathematics education; the aims and general objective as contained in the National Policy on Education (FRN, 2004) are as outlined below:

i. To generate interest in mathematics education and to provide a solid foundation for sustainable living.

ii. To develop precise, logical, and abstract reasoning.

iii. To develop the ability to recognize problems and to solve them with related mathematical skills.

iv. To provide necessary mathematical background for further education.

v. To stimulate and encourage creativity among youths (Obodo, 2004) etc.

Obviously mathematics is a gate-way to mastering of other specializations. Mathematics is a language without which science, commerce, industry the internet and the entire global economic infrastructure is struck dump. It is the only "truly" universal language, and it is an essential part of our personal and working life. Mathematics is not only a language and a subject, it is also critical in fostering logical, rigorous thinking, as such, its influence is immense. Mathematics in science and technological development cannot be underestimated. Mathematics is the most potent instrument that can be used to sharpen the mind. No nation can hope to achieve any measure of scientific and technological advancement: grows beyond its man-power; without proper foundation in school mathematics. Mathematics is the bed rock of all sciences and should as a matter of fact, be properly taught to bring out the intellectual potentials in our young ones with well-structured curriculum.

Concept Curriculum

Several scholars have defined curriculum differently. James (2002) defines curriculum as a sub-total of all experiences the learner undergoes: Ukeje (1990) considered curriculum as a planned learning opportunities offered to learners by education institutions. Ughammadu (2006) defines curriculum as all the learning which is planned and guided by the school, whether it is carried on in groups or individually, inside or outside the school. The above definitions tend to agree on the curriculum as a body of knowledge, a product to achieve certain ends and a process of interaction. Thus, curriculum plays a key role in socialization and acquisition of survival skills. Curriculum is an important instrument in educational system. As education is central to the society, so is curriculum which is the heart and life-wire of education. Curriculum is the propeller of educational programmes and practice. The non-functional or non-implementation of it is injurious to any educational system.

Mathematics curriculum right from the time of introduction of modern mathematics in Nigeria has remained the subject of controversy for teachers and all other practitioners of mathematics. They perceived the curriculum as foreign in nature having little or no ability in addressing the adequate needs of Nigerians and the Nigeria system. With this raging war in curriculum contents, there is no doubt that ineffective delivery of mathematics concepts to students will be a standing order in the system. The perceived external curriculum contents coupled with the nature of mathematics and its concepts makes mathematics more dreadful and scarring in the mind of the learners. The present curriculum was produced by the Nigerian Education Research and Development Council (NERDC, 2013) as 9 – year's Basic Education syllabus. The content of curriculum includes the theme relating to Science Technology and Mathematics (STM).

Problems Facing Mathematics Education

Curriculum of mathematics education encounters many problems in Nigeria educational system. Some of the major problems are outlined as follows:

- **Problems Associated with Mathematics Teachers**

Enoch (1996) opined that the low quality of the teaching personnel constitutes a serious problem in the quest for social reconstruction. Students cannot acquire the necessary skills that are needed in transforming Nigeria in terms of technology without sound and educated teachers.Going by the common saying that "you can't give what you don't have": unqualified teachers lack ability to deliver the contents to those they are teaching beyond what they have already known. If the teacher knows little more than the learners, he may not be able to give concrete interpretation to a concept of which greater understanding can be derived. A teacher who possesses a limited understanding of the subject matter cannot deliver effective teaching as he leaves the gap between the contents and its application which invariably will affect student's knowledge of applicability. One other problem by the teachers is the fact that Mathematics teachers in Nigeria are grossly inadequate. Alagbe (2012) said that many primary and secondary schools have no choice but to employ teachers who have no special training in mathematics because of shortage of mathematics staff.

- **Problem of Funding Mathematics Education**

The issue of funding by the government and other relevant authorities has been a major challenge to mathematics education. The budgetary allocation to the education sector has been grossly inadequate as compared to funding from both developed and some developing countries. In Nigeria, education sector has not received to-most priority in budgetary allocation as it deserves over the years.

- **Challenges of Students in Mathematics**

The vast majority of Nigerian students fear and hate mathematics, because of the seemingly abstractness of its concepts. Okafor and Anaduaka (2015) observed that many students do not immediately see the use or applicability of the subject to their lives and to the world of work around them; so they wonder why they should be troubled with the study of the subject. To these young minds, mathematics still remains a mystery that has no place in reality. Students in secondary schools only view mathematics as requirement in gaining admission into higher institutions of learning rather than its importance.

- **Societal Problems**

It is common to have Nigerian adults declare their lack of competence in mathematics publicly without any feeling of shame whatsoever. This kind of demoralizing and derogatory statement and attitude towards mathematics displayed by the adult members of the society embolden students to continue in a downward trend in their hatred for the subject and lack of mathematical knowledge; this has been made evident with their show of poor performance in the subject during national examinations. Equally important is the societal emphasis on acquiring certificate, not minding the mastery of the content or the subject matter. This scenario had led many students who are not so good in the subject to be involved in examination malpractices – which pose a great challenge to the education of Nigerian citizens.

Recommendations

This paper recommends the following to achieve the best result in in improving mathematics education through its curriculum:

- Highly qualified and competent mathematics teachers should be employed and current euphemism of "man knows man" should be discouraged as regard recruitment and appointment.

- Teacher training institutions curriculum on mathematics education should adequately be improved upon and incentives to encourage many students to read and study mathematics.
- Wages and salaries of mathematics teachers should be improved upon; this becomes necessary because of the tasking and demanding nature of teaching of mathematics.
- Periodic Workshop and Seminars should be organized for Mathematics teachers to improve their efficiency.

Conclusion

These paper emphases for the need for curriculum modification in mathematics are flexible so that all students can have opportunity to learn and benefit maximally, from the education process. Though the curriculum may be the same with that of all regular curriculum, but in some instance there is the need for modification to have curriculum plus or curriculum minus to cater for the learning needs of those in different stages of educational level.

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DEVELOPMENT AND VALIDATION OF ECONOMICS TEACHER-MADE TEST FOR AUTHENTIC ASSESSMENT OF STUDENTS' ACHIEVEMENT IN NORTH CENTRAL STATES OF NIGERIA

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ABSTRACT

This study developed and validated an Economics teacher-made test for authentic assessment of students' achievement in North Central States of Nigeria. In terms of geographical scope, the study was restricted to Nasarawa, Benue and Plateau States of the North Central States of Nigeria. Instrumentation design type with cross-sectional survey research design were used and focused on senior secondary II curriculum. The population of this study comprises 200,530 students. Multi-stage random sampling technique was used to select a sample of 400 respondents for the study. Maikudi Economics Teacher-Made Test (METEMA) developed by the researchers was the instrument for the study. Kudder-Richardson (KR-20) statistic was used to establish the reliability of 0.89 (Internal consistency) of the instrument with validity index of 0.80. Factor analysis was used to answer research questions and establish norms for the METEMA. Findings from the study showed that, the content validity index was found perfect at 0.80 validity index and the METEMA was found to be highly reliable at 0.89 reliability index. It concluded that Economics Achievement Test is a valid evaluation instrument. The study recommends that,teachers, researchers and relevant educational agencies should always establish the content validity index of any instrument they develop, for measuring educational *achievements in order to ensure the items are valid and reliable that is, relevant to the course objective.*

Keywords: Development, validation, teacher-made test, authentic assessment, achievement.

Introduction

In Nigeria, particularly in North Central geo-political zone, Economics is considered as an important subject and is taught at the senior secondary school level. Economics occupies a very important position in the life of man and society. It is a subject concerned with the efficient utilization or management of limited productive resources for the purpose of attaining the maximum satisfaction of human wants (Ochuba, 2011). For Anyaele (2009), Economics is a social science which studies human behaviour as a relationship between ends and scarce means which have alternative uses. Given the foregoing definitions, there is need to add that Economics as a science helps man to understand and manage his scarce resources in order to meet his numerous wants. Toachieve the goals or objectives of Economics at Secondary school level, the teaching and learning of Economics have to be properly done, especially in assessment practices of teachers, not just for those intending to pursue a career in Economics, but also, more generally, as a part of educational foundation which every student should have before leaving school. The framework for assessment begins the same way curriculum design begins.

Authentic assessment is the measurement of "intellectual accomplishments that are worthwhile, significant, and meaningful, as contrasted to multiple-choice standardized tests" (Rubrics, 2011, p.21). Authentic assessment can be devised by the teacher or in collaboration with the student by engaging student voice. When applying authentic assessment to student learning and achievement, a teacher applies criteria related to "construction of knowledge, disciplined inquiry, and the value of achievement beyond the school" (Osadebe, 2012).Teacher-Made tests measure knowledge of facts, concepts, principles, skills, interest and attitude. Teacher-Made tests are primarily used in making classroom-level decisions and are designed with particular reference to the course objectives/learning goals of a specific course, study program or class (Mahajan, 2015). Teacher-Made tests indicate present, not future, proficiency. Such tests evaluate students' understanding of a particular instructional domain in order to make decisions regarding the advancement or capability of the students.

Inadequate valid Economics teacher-made tests according to Allen (2005) are a reason many teachers continue to assign invalid grades to students. If the grades are not accurate measures of the student's achievement, then they do not communicate the truth about the level of the student's academic achievement. Since important decisions are often based on a student's grade, invalid Economics teacher-made tests-might produce grades that may result in dire consequences for the student. If students receive grades lower than ones that accurately depict their true level of Economics academic achievement, it may lead them to believe that they lack the ability to succeed academically in Economics and lower their sense of self-efficacy as well as their motivation to do well in WAEC and NECO Economics examinations (Osadebe, 2010). So, valid items for evaluating students' achievement in Economics secondary school are rare and the possibility of developing such items by the classroom teacher is limited because it is an art that only experts in test development does. It involves a couple of steps scrupulous analysis, and substantial time (Esomonu & Agbonkpolo, 2010). Ali (2012) stated that the validity of a test is the degree of accuracy with which the test measures what it is intended to measure.

Similarly, Onunkwo (2002) explained that validity of an instrument means the degree of qualities, abilities, skills, traits, information it was designed to measure. A valid test ensures that questions are set from all parts of the syllabus. This emphasizes the need to ensure adequate coverage of both subject matter area and the instructional objectives which the students' learning centred on. Eze (2011) explained that a table of specification is used to ensure a systematic coverage of the entire course content and instructional objectives.

Nwagu in Chime (2012), test reliability indicates the extent to which individual differences in scores are attributed to chance errors of measurement, and the extent to which they are attributable to true differences in the characteristics under consideration. However, there is non-existence of valid and reliable instrument which would yield dependable and authentic results of Economics. Also due to changes in curricular objectives, contents, pedagogical/strategies, there is the need for developing an instrument to measure authentic assessment in the Economics. This calls for the need to develop and validate an instrument for authentic assessment in Economics.

Development and validation of test items, refers to construction of a test items, and ensuring that the instrument (test) used measured what it was designed to measure (Nwana, 2008). The general trend in the development of teacher-made test has been-; the definition of the constructs and content to be measured, identification of the target population, item collection and preparation, pilot study, item review, main study, and data analysis with regard to test characteristics (Ritter, Boone &Rubba, 2001). A valid and reliable test should have test characteristics that fall within the accepted range of values, for each characteristic, such as-; validity, reliability, discrimination index, difficulty index, and readability, and it should not be biased against any designated sub-group of test takers, such as gender and school location. These two factors, gender and school occasion are differed on student achievement.

Okereke (2011) found out that the development of the instrument yielded a logical validity index at 0.8, 0.71, 0.78, and 0.63. The finding also supports the work of Opara (2013) who found that the Mathematics Achievement Test is a valid and reliable instrument for measuring achievements in mathematics tests. The content validity index was found perfect. Based on the numbers obtained from 2 raters, the value of content validity was 0.80, this was carried out on a 4-point rating scale very relevant, quite relevant, somehow relevant, and not relevant.The Achievement Test (MAT) was found to be highly reliable with three statistics of 0.73, 0.52, and 0.44. The Mathematics Achievement Test (MAT) was found to be of appropriate difficulty index and distracted positively.The Economics teacher made test items are suitable test items.

Adonu (2009) found out that there was a significant gender related difference in the performance of male and female students in psychomotor tasks. This difference is in favour of the males.42(d) There was no significant difference among theaters in their rating of the student's psychomotor skills on the instrument. The instrument is valid, reliable and measure student's psychomotor skills. Therefore, the instrument was recommended for use. In all, the researcher did not consider the school location, content validity, reliability coefficient, items analysis of teacher-made test on authentic assessment of the response of students to the items of the instrument.

In another research development, Onah (2009) in his finding revealed that there was a significant difference in the mean achievement scores of urban school students and rural school students.(b) there was a rejection of null hypothesis on the influence of sex on student's achievement in ASAT in favour of males. Osadebe (2010) carried out his study on construct valid and reliable test in Economics for secondary school students. Two research questions were drawn to guide the establishment of validity and reliability for the Economics Achievement Test (EAT). It is a multiple choice objective test of five options with 100 items. A sample of 1000 students was randomly drawn to determine the validity and reliability of the test. After item analysis, the result showed that the Economics achievement test has a high face and content validity. The test item validity was determined through Difficulty and discrimination indices. A difficult index or p-value of 0.5 for each item was considered after applying the formula of correction for guessing. The discrimination index was established through point biserial statistics for each item with a correction coefficient of at least 0.3. The test has a reliability coefficient of 0.95 established through the use of Kuder-Richardson formula 20. The test is valid and reliable for assessing students internally and prepares them for external examinations. Moneth (2012) from the results of the analysis, it was found out that: the developed Economics achievement test instrument for Senior Secondary schools has high psychometric properties in terms of facility and discrimination index; the instrument has high reliability index; there was significant difference between the achievement of male and that of female students in Economics at the senior secondary school level in favour of the male students; there was a significant difference in mean achievement between students in schools located in urban areas and those in rural areas in favour of urban students.

Most Economics teachers have continued to develop instruments for measuring students' authentic assessment according to their varied abilities in test construction. Observations show that those teacher-developed testing instruments are generally of doubtful psychometric features since no serious attention might have been paid to their development and validation. For such instruments, either face validation or possibly content validation was employed. In other words, most of the Economics teachers in secondary schools do not seem to possess the competencies required in instrument development and validation. This means that for Economics teachers to use valid and reliable tests experts in test development have to develop them, otherwise the objectives of educational system may not be achieved.Consequently, there is need to develop and validate an instrument for measuring students' attainment through authentic assessment in Economics. On teacher-made test development practices generally, teachers have problems with-: proofreading the test, using a sufficient number of items, and examining student achievement on the items. It is against this background that this study stems up to develop and validate Economics teacher-made test for authentic assessment of students' achievement in North Central States of Nigeria.

Objectives of the Study

The main objective of the study was to develop and validate an Economics Teacher-made test for authentic assessment of students' achievement in North Central States of Nigeria. Specifically, the study intends to:

1. determine the content validity index of Economics Teacher-Made test for authentic assessment on students' achievement.

2. establish the predictive validity of the developed Economics Teacher-Made test for authentic assessment on students' achievement.

Research Questions

The following research questions were raised to facilitate the investigation-:

1. What is the content validity index of Teacher-Made test for authentic assessment of Economics developed by the researcher?

2. What is the predictive validity index of the developed Economics test for authentic assessment by the researcher?

Hypotheses

To facilitate the investigation, the following hypotheses were formulated and tested at the 0.05 level of significance to ensure the development and validity of Economics Teacher-Made test for authentic assessment of students' achievement:
HO_1: The content validity of the developed Economics Teacher-Made test will have logical validity index not less than 0.75 as appraised by experts.

HO_2: The predictive validity index above 0.72 will predict Economics Teacher-Made test as an authentic assessment.

Theoretical Framework of the Study

This study anchored on Item Response Theory (IRT):

Item Response Theory by Lord and Novick in Emaikwu (2005)

Item response theory (IRT) was first propounded by Lord and Novick in Emaikwu (2005) in the field of psychometrics for the purpose of ability assessment. It is widely used in education to calibrate and evaluate items in tests, questionnaires, and other instruments and to score subjects on their abilities, attitudes, or other latent traits. During the last several decades, educational assessment has used more and more IRT-based techniques to develop tests. Today, all major educational tests, such as the Scholastic Aptitude Test (SAT) and Graduate Record Examination (GRE), are developed by using item response theory, because the methodology can significantly improve measurement accuracy and reliability while providing potentially significant reductions in assessment time and effort, especially via computerized adaptive testing. In recent years, IRT-based models have also become increasingly popular in health outcomes, quality-of-life research, and clinical research. For simplicity, models that are developed based on item response theory are referred to simply as IRT models.

Item response theory (IRT) is a collection of measurement models that attempt to explain the connection between observed item responses on a scale and an underlying construct. Specifically, IRT models are mathematical equations describing the association between subjects' levels on a latent variable and the probability of a particular response to an item, using a non-linear monotonic function. As in classical test theory, IRT requires that each item should be distinct from the others yet should be similar and consistent with them in reflecting all important respects of the underlying attribute or construct. Item parameters in IRT are estimated directly using logistic models instead of proportions (difficulty or threshold) and item-scale correlations (discrimination). There are a number of IRT models varying in the number of parameters (one, two and three-parameter models) and whether they handle dichotomous only or polychromous items more generally.

According to Demars (2008), IRT is also sometimes called latent trait theory. This is a modern test theory (as opposed to classical test theory). It is not the only modern test theory, but it is the most popular one and is currently an area of active research. IRT requires stronger assumptions than classical test theory. IRT is much intuitive approach to measurement once one gets used to it. In IRT, the true score is defined on the latent trait of interest rather than on the test, as is the case in classical test theory. IRT is popular because it provides a theoretical justification for doing lots of things that classical test theory does not. Dodeen and Darabi (2009) assert that some applications of IRT include:

Item bias analysis-IRT provides a test of item equivalence across groups. One can test whether an item is behaving differently for blacks and whites or for males and females, for example. The same logic can be applied to translations of attitude scales into different languages. One can test whether the item means the same thing in English and French, for example. Equating-Sometimes there are scores on one test and would like to know what the equivalent score would be on another test (e.g., versions or forms of the SAT). IRT provides a theoretical justification for equating scores from one test to another (Ayala, 2009). Tailored Testing-IRT provides an estimate of the true score that is not based on the number of correct items. This frees us to give different people different test items but still place people on the same scale. One particularly exciting feature of tailored testing is the capability to give people test items that are matched (close) to them.

Methods of Data Collection

Instrumentation design type with cross-sectional survey research design were used and focused on senior secondary II curriculum. The population of this study comprises 200,530 students. Multi-stage random sampling technique was used to select a sample of 400 respondents for the study. Maikudi Economics Teacher-Made Test (METEMA) developed by the researchers was the instrument for the study. Kudder-Richardson (KR-20) formula was used to establish the reliability of 0.89 (Internal consistency) of the instrument with validity index of 0.80. For the purpose of this study, one instrument developed by the researchers was used for data collection. The instrument consists of 20 items multiple-choice test drawn from various Economics topics as recommended by the NERDCcurriculum for SS II. The instrument was developed by the researchers. Each test item in the instrument has five response options, namely A, B, C, D and E with only one option as the key while others are distracters. Instructional Assessment Resources (IAR, 2011) asserted that "an item analysis involves many statistics that can provide useful information for improving the quality and accuracy of multiple-choice or true/false (question)". Factor analysis was use to answer research questions and establish norms for the METEMA while t-test was used to test the formulated hypotheses at 0.05 level of significance.

RESULTS

Question 1: What is the content validity index of Teacher-Made test forauthentic assessment of Economics developed by the researcher?

The content validity index (CVI) of Teacher-Made test forauthentic assessment of Economicsdeveloped by the researcher was computed based on the joint ratings of relevance of Maikudi Economics Teacher-Made Test (METEMA) items by three content experts.

Table 1: Showing Joint Ratings of the Relevance of METEMA Items, by Three Content Experts Rating on 20 Items

Experts	Content Validity Indices	Averageof the index	Guess Indices	No of Items
1	0.80		0.067	
2	0.70	0.80	0.065	100
3	0.64		0.076	

This was carried out using a 5-point scale for the analysis. This implies that 80% of items which is equivalent to 80 items out of 100, as they were rated quite relevant and very relevant to the component objectives. Therefore, the content validity index of Maikudi Economics Teacher-Made Test for authentic assessment of Economics was 0.80. This implies that Maikudi Economics Teacher-Made Test was valid during the exercise. The percentage scores from the validating scales were summed up and their means for the respective instruments translated into the logical validity indices otherwise called rational validity. Anikweze (2013) lamented that any validity index that is above 0.70, the instrument is valid for carrying outa research.

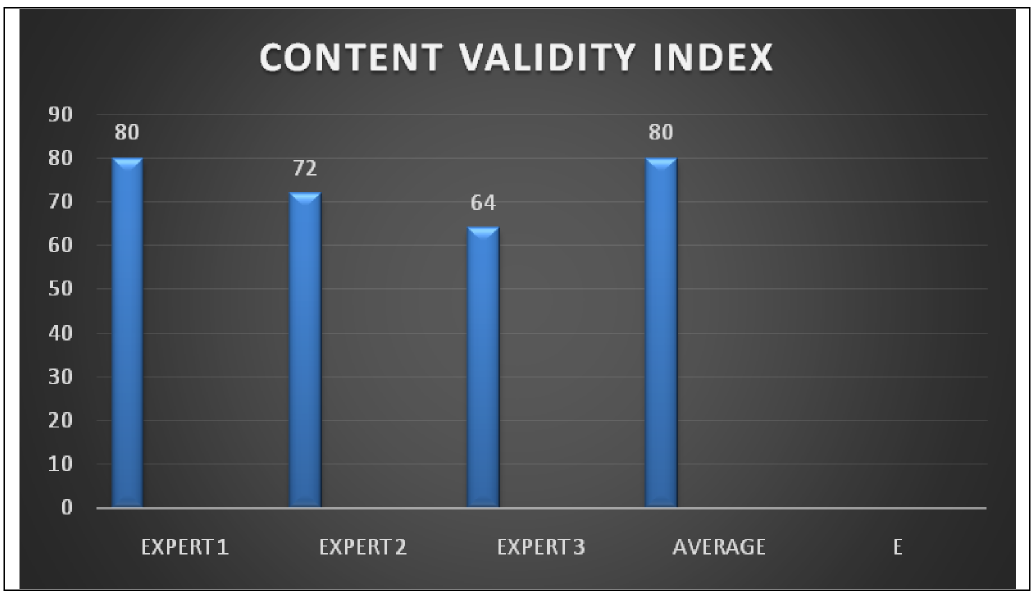

Figure 1: Simple Bar Chart Represent Content Validity Index (CVI) of Teacher-Made Test

Research Question 2: What is the predictive validity index of the developed Economics test for authentic assessment by the researcher?

Table 2: Predictive validity index of the developed EconomicsTeacher Made Test

Variables	Predictive Validity Index Statistics

Predictive Validity index	Teacher Made Test Items Standardized	Guess Index	N of Items
0.80	0.64	0.048	20

Table 2shows that the predictive validity index was 0.80. This implies that, predictive validity index of MATEMA predicted the authenticachievement of students' in Economics Teacher Made test.

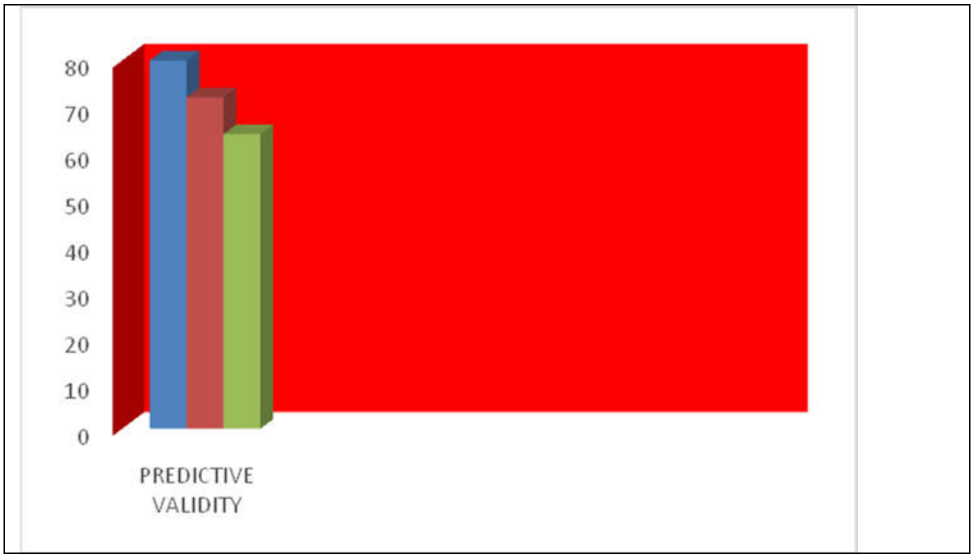

Figure 2: Simple Bar Char of the Predicted Validity index of MATEM

Testing of the Hypotheses

Hypothesis 1: The content validity of the developed Economics Teacher-Made test will have logical validity index not less than 0.75 as appraised by expert stable

Table 3: t-Test Statistics shows Content Validity of the Developed Economics Teacher-Made Test of Logical Validity Index as Appraised by Experts.

t-test for independent samples

Variables	N	Mean	SD	Df	Level of Significance	T	Sig. (2-tailed)
Content validity	241	2.34	1.10	398	0.05	0.796	0.784
Authentic Assessment	159	2.11	1.08				

Analysis of the data using t-test for independent sample indicated means of (Content validity) and Authentic Assessment) with 398 degree of freedom at 0.05 level of significance. T-calculated was 0.796. This means the null hypothesis was rejected in both content validity and authentic assessment responses and alternative hypothesis was accepted which revealed that content validity of the developed Economics Teacher-Made test has logical validity index not less than 0.75 as appraised by experts. That is, the logical validity index of 0.80 was obtained by experts and as showed in table 1 above. This shows that the Teacher-Made test used for this test research was valid for the study.

Hypothesis 2: There is no significance difference between predictive validity index of 0.72 and Economics Teacher-Made test for an authentic assessment

Table 4: Shows thet-test of significant for the predictive validity of Teacher Made Economics Test

t-test for independent samples

Variables	N	Mean	SD	Level of sign.	T	df	Sig. (2-tailed)
Predictive validity	238	2.65	1.45	0.05	0.593	325	0.567
Authentic Assessment	162	2.43	1.32				

Analysis of the data using t-test for independent sample indicated a predicative validity index of 0.82 with a degree of freedom of 398 at the 0.05 level of significance. This means the alternative hypothesis was accepted in both validity and authentic assessment responses and null hypothesis was rejected which revealed that predictive validity index of 0.82 predicted Economics Teacher-Made test on authentic assessment of students' achievement in Economics as shown in table 2 above.

Discussion of Findings

The first finding of the study showed that the content validity index of the developed Economics Teacher-Made test has a logical validity index of 0.87. This finding agreed with the work of Okereke (2011) who found that the development of the instrument yielded a logical validity index at 0.8, 0.71, 0.78, and 0.63. The finding also supports the work of Opara (2013) who found that the Mathematics Achievement Test is a valid and reliable instrument for measuring achievements in mathematics tests. The content validity index was found perfect. Based on the numbers obtained from 2 raters, the value of content validity was 0.80, this was carried out on a 4-point rating scale very relevant, quite relevant, somehow relevant, and not relevant. The Achievement Test (MAT) was found to be highly reliable with three statistics of 0.73, 0.52, and 0.44. The Mathematics Achievement Test (MAT) was found to be of appropriate difficulty index and distracted positively. The Economics teacher made test items are suitable test items. The suitability of the items was a function of the average rating score accorded each item of the appropriateness of each item. Second finding of the study revealed that predictive validity index of 0.82 predicted Economics Teacher-Made test on authentic assessment of students' achievement in Economics. This finding agreed with the work of Osadebe (2010) who found that validity of 0.78 predict students internally and prepares them for external examinations. The finding also supports the work of Adonu (2009) who found that there was no significant difference among theaters in their rating of the student's psychomotor skills on the instrument. This also agreed with Moneth (2012) who found out that there was significant difference between the achievement of male and that of female students in Economics at the senior secondary school level in favour of the male students; there was a significant difference in mean achievement between students in schools located in urban areas and those in rural areas in favour of urban students.

Conclusion

The Economics Achievement Test is a valid evaluation instrument. The content validity index (CVI) was found perfect. Based on the numbers obtained from 2 raters, the value of CVI was 0.80. The METEMAwas found to be highly reliable.METEMA was found to be of appropriate difficulty index and distracted positively. The METEMAtest items are suitable test items. The suitability of the items was a function of the average rating score accorded each item of the appropriateness of each item.

Recommendations

Based on the findings of the study, the following recommendations were made;

1. Teachers, researchers and relevant educational agencies should always establish the content validity index of any instrument they develop, for measuring educational achievements in order to ensure the items are valid and reliable that is, relevant to the Economics objective.

2. There should always be established cut-off scores or a pre-determined proficiency level by teachers and relevant educational agencies, in order to determine mastery level of the specified objectives and Economics teachers, researcher and relevant educational agencies should ensure that the instrument they develop for measuring achievements is reliable, as instrument of measuring achievement are used in decision making of achievement of students.

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QUALITY TEACHING FOR MEANINGFUL LEARNING OF BASIC SCIENCE AND TECHNOLOGY CONCEPTS WITH COMPUTER ANIMATION STRATEGY IN 21st CENTUARY

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Abstract
The study investigated the use of computer animation strategy as a quality teaching strategy for meaningful learning of basic science and technology concepts by junior secondary two students in Akko Local Government of Gombe State. The sample comprised 141 students 70 males and 71 females, selected from a population of 5450 junior students in the study area. Two schools out of the 46 schools were randomly selected using the simple random sampling technique. The study employed the non- randomized pre-test-post-test non- equivalent control group design. The instruments of data collections are the Basic Science and Technology Achievement Test (BSTAT). Two research questions were answered using means and standard deviation while the hypotheses were tested using t-test, at 0.05 level of significance. The findings showed that students exposed to the animated strategy achieved significantly higher in BSTAT than their counterparts taught using the lecture method among others. It was therefore, recommended that BST teachers should use animation in teaching of Basic Science and Technology concepts since it results in meaningful learning.

Introduction

In Nigeria, basic science was developed by the Science Teachers' Association of Nigeria (STAN) and introduced to the schools under the acronym of Nigerian Basic Science Project (NISP). One of its objectives among others is to lay a sound foundation for subsequent study of science and its related subjects at the senior secondary school level as stated in the national Policy on Education (Federal Ministry of Education [FME], 2009). Such an objective can be achieved through the appropriate use of instructional strategies that allow students participate actively in the learning process. Basic science is a subject taught at the primary as lower basic science and upper basic science in junior secondary school levels of education in Nigeria.

The contributions of science and technology to overall development of any nation therefore, cannot be overemphasized. This is the reason science holds an important position in the curriculum in the Nigerian educational system. Without doubt, Nigeria has made a lot of efforts in the search for education that is functional which will yield economic and political self-sufficiency for its citizenry (Ahmed, Omosewu & Akanbi, 2012). For instance, one of the efforts were the introduction of the 6-3-3-4 system of education and later the of 9-3-4 system. The government reviewed the science, technology and mathematics curricular in line with global standard emerging issues, trends and societal values to ensure quality teaching and learning of science and technology.

Despite the efforts of the government to boost the teaching of science, students consistently achieve poorly in basic science subject in public examinations (Usman, 2010). Researchers such as (Atadoga & Lakpini, 2013) found that the persistent low academic achievement in science education is attributed to teacher instructional strategies among others. Low achievement in science has been a matter of serious concern to teachers, parents and other stakeholders in Nigeria. In view of the emphasis the national policy lays on teaching science to every Nigerian child and scientific literacy. Thus, instructional strategies used by teachers in teaching-learning process have significant influence on learners' academic achievement.

As a result of the shortcomings of the traditional method of teaching, various activity- based teaching strategies have been proposed for the purpose of improving the teaching and learning of basic science. Among these strategies are concept mapping strategy, problem-solving approach, conceptual change instructional strategy, computer animation strategy, outdoor laboratory strategy and cooperative strategy (Ozoji, 2010, Olorukooba & Lawan, 2010). However, there is paucity of studies in the area of using computer animation strategy in teaching of basic science in Nigerian junior secondary schools.

In Nigerian schools where materials and apparatus for practical are either unavailable or insufficient, the use of computer animation could be a welcome solution. According to Mintz (1993) one of the most promising computer applications in science instruction is the use of animation for teaching concepts and principles, which cannot be taught by convectional laboratory experimentation. Several methods of teaching have been used by different authors for the purpose of enhancing achievement of students in science but they do not appear to have yielded the much desired results.

Animations are a form of dynamic representation that display processes that change over time. According to Sanchez, Canas, and Novak, (2010), educational animations are animations produced for the specific purpose of fostering learning. The use of animations help students understand and remember information has greatly increased since the advent of powerful graphics-oriented computers.As such, animations are valuable aids in supporting the visual aspects of long-term memory. It is through active processing of the visual and verbal pathways that students construct mental modules, these mental models are incorporated within student's prior knowledge, so that meaningful learning occurs. It is through this active meaningful learning that students achieve better outcomes in different levels of cognitive domains (Kasaji, 2010).

A considerable amount of researches has focused on gender differences in science classrooms (Nsofor, 2010). Some studies have found gender disparity in the use of instructional methods on students' achievement in science subjects in favour of male students (Obeka, 2013) while (Aminu, 2015) found no significant difference in the academic achievement of male and female students exposed to animated-media strategy thereby making the findings of such studies inconclusive. It is against this background that this paper investigated the quality of teaching for meaningful learning in basic science and technology using computer animation strategy on students' achievement in basic sciencein Akko local Government, Gombe State.

Statement of the problem

Basic science is a very important subject which lays the foundation for future science learning. Findings Ozoji (2010) on the status of basic science education in schools in Nigeria show that basic science classroom activities are still dominated by teacher- centered methods of teaching, such as the lecture method which has been found to be ineffective in promoting meaningful learning science. As such teachers constantly used lecture method in teaching the subject and ignore other strategy such as animations, a gap in the application of media technology to improve students' achievement in basic science concepts and refined teachers' methodological techniques in the classroom.

The achievement of students in Junior Secondary School Certificate Examinations (JSCE) over the years has equally not been impressive. Analysis of Junior Secondary School Certificate Examinations (JSSCE) Basic science results in public junior secondary schools in Akko Local Government Area of Gombe State showed that the average failure rate in basic science from 2015 to 2018 ranged from 42.49% to 86.20% (Gombe Educational Research & Development [GERD], 2019). This trend of results was attributed to lack of use of appropriate teaching methods, inadequate laboratory facilities, equipment and apparatus. For a country that is yearning for technological advancement, these results are not encouraging. There is a need therefore, to make efforts at improving the pedagogy of basic science teachers for meaningful learningand betterunderstanding of difficult basic science concepts and achievement outcomes by students**.**

Limited literature exists on the impact of animation on students' academic achievement at junior secondary schools in the study area. There is a need therefore to provide an alternative teaching strategy which will hopefully incorporate cognitive, affective and psychomotor domains of students like the use of animated strategy**.**

Purpose of Study

The purpose of the study was to find out the effects of computer animation strategy on students' achievement in basic science in Akko Local Government of Gombe State. The specific objectives were to:

1. Find out the effects of computer animation strategy on achievement of JS II students in Basic Science Achievement Test,
2. Determine the effects of computer animation strategy on JS II male and female students' achievement mean scores in Basic Science Achievement Test.

Research Questions

Two research questions guided the study:

1. What are the pre-test Basic Science Achievement Test mean scores of the experimental group exposed to computer animation strategy and control group not exposed?

2. What are the post-test Basic sciences Achievement Test mean scores of JS II male and female students exposed to computer animation strategy?

Hypotheses

Two null hypotheses were tested at 0.05 levels of significance

HO_1. What are the post-test Basic Science Achievement Test mean scores of the experimental group exposed to computer animation and control group not exposed?

HO_2. There is no significant difference between the post-test mean scores of JS II male and female students exposed to computer animationstrategy in Basic Science Achievement Test.

Research Method

The study employed the non-randomized, pretest-posttest non-equivalent control group design. The aim of the design was to compare the gain scores of the experimental and control groups at the end of the exposure to different conditions of teaching. A pre-test was administered to the experimental and control groups before exposure of the groups to different conditions of teaching. A post-test was administered after four weeks of teaching to determine the effect of the two instructional methods on students' achievement in basic science concepts taught.

The population for this study consisted of 5450 junior secondary schools two students in 46 public senior secondary schools in Akko Local Government Area of Gombe State. The schools used the same academic calendar and same basic science curriculum. The choice of JS II students was because they were believed to be academically more stable, and are not under pressure of any immediate public examinations than the JS III students. The sample for the study consisted of a total of 141JS II students (71 males and 70 females) drawn from a sample of two secondary schools in Akko local Government.The simple random sampling technique was used to select two schools from 46 senior secondary schools in Akko Local Government using the hat and draw method. However, there was no sampling of students since they were used in their intact class settings.

The instruments used for data collection was the Basic Science Achievement Test (BSAT). The BSAT consisted of two sections, namely, section A and section B. Section A was on students' personal data consisting of items on the name of the school, class and gender while section B consisted of 30 multiple choice items with four options, A, B, C, and D each. Each of the items in the BSAT carried one mark, giving a total of 30 marks for the 30 items.

The items were constructed by the researcher and validated by science educators in the Department of Science Education, Federal University of Kashere. The reliability index of the BSAT was determined as 0.95 using pearsons` product moment correlation coefficient.

Methods of Data Analysis

Means and standard deviations were used to answer research questions while the t-test statistic was used to test hypotheses at 0.05 level of significance.

Research Question One

What are the posttest Basic Science Achievement Test means scores of the experimental group exposed to computer animation strategy and control group not exposed?

Table 1: Basic Science Achievement Posttest Mean Scores of Students exposed to Computer Animation strategy and those of Students not exposed.

Group	N	Mean	SD
Experimental	71	68.5911.2	
Control	70	41.317.65	

Result in Table 1 shows that posttest mean scores of students exposed to computer animation strategy and those of students not exposed were 68.59% and 41.31% respectively. This result shows that the experimental and control groups were equivalent on the basis of their achievement in BSAT.

Research Question Two

What are the post-test mean scores of JS II male and female students exposed to computer animation in Basic Science Achievement Test?

Table 2: Post-test Mean Scores of Male and Female Students Exposed to Computer Animation in Basic Science Achievement Test

Gender	N	Mean	SD
Male	36	64.25	10.9
Female	35	73.06	9.78

Results from Table 2 reveals in the BSAT post-test mean scores of JSS II male and female students exposed to computer animation strategy were 64.25%. and 73.06. The result indicated that female students achieved better than male students in BSAT

Hypothesis One

Table 3: Summary of t-Test Analysis of BSAT Posttest Mean Scores of Students Exposed to Computer Animation Strategy in Basic Science Achievement Test and those not Exposed.

Group	N	Mean	SD	Df	t-cal.	t-crit.
Experimental Group	71	68.59	11.2			
	139	17.35	1.98			
Control Group 70	41.31	7.65				

Table 3 reveals that the calculated value of t (17.35) was greater than critical value of t (1.98) at 139 degree of freedom and 0.05 level significance. This means that there was a significant difference between post-test mean scores of JS II students taught with computer animation strategy and those of students taught with the lecture method. Therefore, the null hypothesis was rejected.

Hypothesis Two

There is no significant difference between the BSAT post-test mean scores of JSII male and female students exposed to computer animation strategy.

Table 4: Summary of T-test Analysis between BSAT Post-test Mean Scores of Male and Female Students Exposed to Computer Animation Strategies

Gender	N	Mean	SD	Df	t-cal.	t-crit.
Male	36	64.25	10.9			
	69	3.65	2.00			
Female	35	73.05	9.78			

Table 4 shows that calculated value of t (3.65) was greater than the critical value of t (2.00) at 69 degree of freedom and 0.05 level of significance. The null hypothesis was rejected. This means that there was a significant difference between the BSAT post-test mean scores of males and females when exposed to computer animation strategy.

Discussion

The purpose of this study was to find out the effects of computer animation strategy on students' achievement in basic science. Before the commencement of the treatment, it was established that the students were equivalent on the basis of their knowledge of basic science through the administration of a BSAT pre-test. Therefore, the observed differences in the results were due to the treatment and not as a result of the characteristics of the students before exposure to the different methods of teaching. The results of the study showed that computer animation strategy led to improvement in students' achievement in basic science. Gender was found not to affect students' achievement when computer animation strategy was used as a method of instruction. Two research questions and two research hypotheses guided the study.

The result presented in Table 1 revealed that BSAT posttest mean score of the experimental and the control groups were 68.59% and 41.31% respectively. The result showed that improvement in achievement was as a result of the students' exposure to different teaching methods.The result presented in the Table 2reveals that male and female students exposed to computer animation in Basic ScienceAchievement Test had post-test mean scores of 64.25% and 73.05% respectively. The result further revealed that female students achieved better than male students in Basic Science Achievement Test.

The findings in Table 3 revealed a significant difference between the post-test achievement mean scores of students taught with computer animation strategy and those of students not exposed. This indicated that computer animation strategy facilitated students' understanding in basic science concepts.This finding is supported by Lin, (2011), Aksoy (2012) and Thomas and Israel (2014). Tayo, (2012) finding reveals that students exposed to developed animated agricultural package performed significantly better than those exposed to the conventional lecture method.

The findings in Table 4shows a significant difference between the Basic Science Achievement Test mean scores of male and female with female students' achieving better their male counterparts in BSAT. The finding is supported with Olson (2002) who found that female students performed better than male students.However, the finding of Alireza and Sheela (2011) is in line of this study. These researchers reported that use of computer animation instruction in teaching promoted

learning and retention more in females than in males. This result contradicts Rogheyeh and Oskrochi (2010) which revealed that male students performed better than female students in science concepts. This finding also disagree with findings by Aminu (2015) which revealed no significant difference in the academic achievement of male and female students exposed to animated-media strategy.

Conclusion and Recommendation

This paper examined the quality of teaching and learning of basic science using computer animation strategy. The study revealed that computer animation strategy improved students' achievement in basic science concepts than the lecture method. The mean achievement score of the female students was found to be slightly greater than that of their male counterparts with the computer animation strategy.These results therefore revealed that computer animation strategy is a viable alternative to the lecture teaching method in providing quality of teaching and learning basic science concepts.

Based on the findings of this study, the following recommendations were made:

1. Basic Science teachers should use computer animation strategy in teaching basic science, it enhances achievement of students in the subject.

2. Ministries of Education should ensure that computer animation activities are incorporated in the Basic Science curriculum through the relevant agency.

3. Basic Science teachers should use gender-friendly instructional strategies, such as animation strategy in their instruction to improve the achievement of both male and female students in the subject.

4. The teachers need to be trained in computer based innovation and be always updated on new developments in instructional technology.

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INFLUENCE OF ANALOGY-BASED TEACHING ON THE STUDENTS' ATTITUDES TOWARD CHEMICAL EQUILIBRIUM AMONG SECONDARY SCHOOLS IN NGURU, YOBE STATE, NIGERIA

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Abstract
This study investigated the influence of analogy-based teaching on the students' attitudes toward chemical equilibrium among secondary schools in Nguru Local Government Area, Yobe State. Quasi experimental group design wasemployed in the study using a sample of 50 students comprising of 26 male and 24 female students from the government secondary school (SS 2) through purposive sampling technique. The studentswere assigned into experimental group and aquestionnaire on students' attitude toward chemical equilibrium (SATCE) was used. The instrument was tested through test-retest method and revealed a reliability coefficient of 0.72 through Pearson product moment correlation coefficient.The questionnaire was then administered on the group and their responses show no significant difference. Thereafter, the group was taught concept of chemical equilibrium using analogy-based teachingfor six weeks. A questionnaire was again administered on the students for determining their attitudes toward chemical equilibrium and their responses obtained were analyzed using chi-square statistical tool at p < 0.05. The finding of the study revealedpositive attitude of the students toward chemical equilibrium after been exposed to the treatment. However, the finding also revealed no significant difference between male and female students' attitudes in the analogy-based teaching. Based on the findings; chemistry teachers should use analogy-based strategy in teaching of chemical equilibrium concept in secondary schools as it improved students' attitudes. Thus, it is recommended for teaching of other topics in chemistry.

Keywords: Analogy-based teaching, Attitude and Chemical equilibrium

Introduction
Science education takes into cognizance the content of Biology, Chemistry and Physics for the basic role that secondary schools play in acquisition of scientific concepts and skills for the betterment of individuals, community and Nigeria at large (Brown, 2015).This helps in preparing the young generation for sustainable living as well as providing a sound foundation for pursuing science and science related disciplines in the tertiary institutions of learning.

Chemistry is one of the major components of science education subject in Nigeria and its curriculum content has to reflect learner-centred environment especially in the 21st century.Chemistry involves the study of properties, composition, structure, transformation and uses of matter as well as energy accompanying chemical reactions (Ababio, 2010; Emendu, 2014). However, chemistry comprised of many topics such as gaseous state, electrolysis, redox reactions, chemical equilibrium and nuclear chemistry which students are expected to learn and comprehend for them to understand the universe and make a significant contribution of the knowledge toward the development of the society(Brown, Lemay, Bursten, Murphy and Woodward 2012). Obviously, some of the topics especially chemical equilibrium as the focal point of this research is abstract in nature and needs to be properly taught thereby helping students to develop positive attitude toward the concept as par curriculum issues and innovation in science education.

Chemical equilibrium is a dynamic equilibrium attained when the rate of forward reaction is exactly balanced the rate of backward reaction thereby producing no net change in the concentration of the reactants and products (Ababio, 2011). However, the abstract nature and difficulty of chemical equilibrium in terms of dynamic equilibrium, equilibrium constant, Le chatelier's principle and effect of changes in temperature, concentration and pressure have been reported in many studies as obstacles to students' understanding of the concept (Türk, Ayas & Karshi, 2010; Pekmez, 2010). These to some extent have resulted to unwholesome students' attitudes towards chemical equilibrium.

Brown et al (2012) also emphasized the difficulty and abstract nature of chemical equilibrium on the basis of the associated features that need urgent attention to help students conceptualized the concept considering its impact in other important aspect of chemistry such as electrochemistry, acid-base reaction and oxidation- reduction processes. As these involved dissolution and deposition, neutralization and equality of oxidant and reductant processes which call for dynamic equilibrium as well as reversibility of the reactions. It is therefore pertinent that, the concept of chemical equilibrium has to be properly taught to enhanced and promote positive students' attitude toward the aspect.

Attitude refers to aspect of thinking or feeling toward something due to certain associated features or understanding that pleases the mind especially in teaching and learning of chemical equilibrium in this context. The attitude students hold based on some experiences or knowledge would invariably influence the way they respond to objects (Sakariyau, Taiwo and Ajagbe, 2016). Muhammad (2015) opined that, attitude could be referred as general expression of mindthat depicts either positive or negative inclination toward certain things especially in learning context. In lined with this statement,Ogembo, Otanga and Yaki (2015), Zudonu and Njoku (2018)affirmed that, attitude has the potentiality to either enhanced or inhibit learning process.For positive attitude to be achieved toward a particular concept of study, teaching should encompass effective strategy that will make students to become actively involved in the learning process which could be achieved through analogy-based teaching.

Analogy-based teaching involves transfer of knowledge from familiar concept to a target concept on the basis of certain structural correspondence that exists between the two concepts in lined with six steps in Teaching –with-Analogy (Turk, Ayas & Karshi, 2010). Analogy as a teaching method can help students to form concrete mental pictures of chemical equilibrium concept as it encourages them to use their experiences to provide explanation to the new body of knowledge (Raviolo & Garritz, 2009). This helps in promoting comprehension and effective attitude toward the concept.

Analogy-based instructional strategy can effectively bridge the gap between students' perceptible concepts and imperceptible knowledge of theoretical concepts through visualization of possible events that will be occurring (Rawatee, 2011).Analogy also involves mapping of peculiar similarities between the familiar concept and the target concept so as to establish a system of relationship that exist among the concepts (Raviolo & Garritz, 2009).Some of the analogies include rubber bands; plastics containers, water, tube, clips, weighing balance, balls and students as they interact with some of them both at home and in schools for effective comprehension of chemical equilibrium.This would give students opportunities to relate their previous knowledge with current knowledge to be learn through range of tasks as such would be guided by the teacher in establishing the system of the relationship as advocated by contructivists. This active involvement makes both male and female students to develop desired attitude toward the concept with corresponding improved performance.

Gender refers to state of being male or female.The concept of gender in academics did not emphasized on dominance of any sex over the other but cautioned on equality of competencies and endowed capability of individuals in the aspect of human endeavours. Adolphus and Mumini (2016) asserted that, differences in academic pursuit might be attributed to cognitive styles, attitude, inactivity and activity in the course of teaching and learning process. In lined with this, some researches established the existence of equality among male and female students toward certain chemical concepts (Sakariyau, Taiwo and Ajagbe, 2016; Zudonu & Njoku, 2018). On this basis,this research was equally set out to see whether male and female students would have same or different attitude toward chemical equilibrium.

Statement of the Problem

Chemical equilibrium is a concept in chemistry that is abstract and difficult for students understanding and comprehension (Gongden, Gongden & Lodip, 2011; Sa'id &Ibrahim, 2017). The abstract nature of chemical equilibrium in terms of dynamic equilibrium, equilibrium constant, Le Chatelier's principle and effect of changes in temperature, concentration and pressure have made students developed unwholesome attitude toward chemical equilibrium. This was obvious because, the teaching was not students-centered method that would give them positive thought as observed in the school setting. Such was also evident by some of the factors that led to poor students' achievement in the National Examination Councilin the state in which defective method attributed a lot with consequences on students' attitude (Education Resource Centre, Damaturu 2016). It is in light of this that, this studyused analogy-based teaching to bring about desired students' attitude toward chemical equilibrium concept.

Objectives of the Study

The study determined:

1. The influence of Analogy-Based Teaching on the students' attitude toward chemical equilibrium.

2. The influence of Analogy-Based Teaching on male and female students' attitude on exposure to chemical equilibrium.

Research Hypotheses

Ho_1: There is no significant influence of Analogy-Based Teaching on the students' attitude toward chemical equilibrium.

Ho_2: There is no significantdifference in the influence of Analogy-Based Teaching on male and female students' attitude on exposure to chemical equilibrium.

Methodology

The study adopted Quasi experimental group design. The area where the study was conducted was one of the secondary school inNguru Local Government Area, Yobe State. A sample of 50 students was used in the study comprising of 26 male and 24 female students from the government secondary school (SS 2) through purposive sampling technique. The students wereassigned into experimental group and aquestionnaire tagged students' attitude toward chemical equilibrium (SATCE) was used. The instrument was a structured questionnaire consisting of twelve items developed on a five point Likert scale as strongly agree (SA), agree (A), undecided (U), strongly disagree (SD) and disagree (D). The instrument was validated by chemistry education specialists and test and measurement specialist. The instrument was tested through test-retest method on twenty students and revealed a reliability coefficient of 0.72 through Pearson product moment correlation coefficient.The questionnaire was then administered on the group and their responses show no significant difference. Thereafter, the group was taught concept of chemical equilibrium using analogy-based teaching for six weeks. A questionnaire was again administered on the fifty students for determining their attitudes toward chemical equilibrium and their responses obtained were analyzed using chi-square statistical tool at$p < 0.05$ using statistical package for social sciences (SPSS 16.0 version).

Results and Discussion

The data analysis of the responses obtained and the result with respect to each research hypothesis is presented in the following tables:

Ho_1: There is no significant influence of Analogy-Based Teaching on the students' attitude toward chemical equilibrium.

To test the stated hypothesis, the responses of the students to the respective questions in terms of their frequency count was analyzed using chi-square (X^2) statistical tool as presented in table 1:

Table 1: Chi-square (X^2) Analysis for Students' Attitude toward Chemical Equilibrium

Items/ Responses	1	2	3	4	5	6	7	8	9	10	11	12	X^2_{cal}	P-Value
SA Count	19	17	20	18	15	15	16	13	21	18	14	17		
Expected	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9		
A Count	24	23	22	25	27	15	19	12	23	25	15	27		
Expected	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.4		
													72.34	0.005
U Count	2	3	2	2	3	8	4	9	2	2	8	2		
Expected	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
SD Count	2	3	4	2	3	2	5	4	2	2	3	2		
Expected	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8		
D Count	3	4	2	3	2	10	6	12	2	3	10	2		
Expected	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		

Significant at $p < 0.05$

As depicted in the Table 2, the p-value obtained is 0.005 at $p < 0.05$ level of significance which is significantly less than 0.05 choosing alpha level. This means, the null hypothesis was rejected and alternate type was accepted that, there is significant influence of Analogy-Based Teaching on the students' attitude toward chemical equilibrium.

Ho_2: There is no significant difference in the influence of Analogy-Based Teaching on male and female students' attitude on exposure to chemical equilibrium.

To test the stated hypothesis, the responses of the students to the respective questions in terms of their frequency count was analyzed using chi-square (X^2) statistical tool as presented in table 2:

Table 2: Chi-square (X^2) Analysis for Male and Female Students Attitude toward Chemical Equilibrium

Gender		SA	A	U	SD	D	X^2_{cal}	P-Value
Male	Count	109	132	26	17	28		
	Expected	105.6	133.6	24.4	17.7	30.7		
							1.05	0.906
Female	Count	94	125	21	17	31		
	Expected	97.4	123.4	22.6	16.3	28.3		

Not significant at $p > 0.05$

As depicted in the Table 2, the p-value obtained is 0.906 at $p > 0.05$ level of significance which is significantly greater than 0.05 choosing alpha level. This means, the null hypothesis was retained that; there is no significantdifference in the influence of Analogy-Based Teaching on the male and female students' attitude toward chemical equilibrium.

Discussion

The finding on hypothesis one ($X^2 = 72.34$; $p = 0.005 < 0.05$) reveals that, analogy-based teaching had significant influence on the students' attitude toward chemical equilibrium. This entails that, the null hypothesis was rejected and alternate type was accepted because the p-value obtained was less than the chosen alpha level. This was obvious as the students were actively involved in the course of the teaching and learning through visualization of similar concept in the analogies as related to certain features of chemical equilibrium which enhanced their positive attitude toward the concept. This result was in agreement with the finding of (Muhammad, 2015; Sakariyau, Taiwo & Ajagbe, 2016).

The finding on hypothesis two ($X^2 = 1.05$; $p = 0.906 > 0.05$) depicts that, analogy-based teaching had no significant difference in the influence on male and female students' attitude toward chemical equilibrium. This shows that, the null hypothesis was upheld because the p-value obtained was greater than the chosen alpha level. This occurs as the students interact with the analogies that were familiar to them as used in teaching of chemical equilibrium through teacher's guidance for effective assimilation and accommodation of the concept. This mean, analogy-based teaching was gender friendly as equality of attitude was observed and the result was in conformity with the finding of (Zudonu & Njoku, 2018).

Conclusion

The following conclusions were significant based on the finding of this study:

1. Analogy-Based Teaching was found to have significant influence on the students' attitude toward chemical equilibrium as revealed in the analyzed data.

2. Analogy-Based Teaching was found to be gender friendly for the students' attitude toward chemical equilibrium.

Recommendation

This study had made the following recommendations:

1. Chemistry teachers should use analogy-based teaching in teaching of chemical equilibrium as it enhanced students' attitude;

2. Analogy-based teaching should form the component part of the senior secondary school's chemistry curriculum as par innovation in science education;

3. Chemistry teachers should clearly select, guide and use relevant analogies as well as indicate where the analogies break;

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INFLUENCE OF SCIENCE PROCESS-SKILLS ACQUISITION ON CREATIVITY AMONG SECONDARY BIOLOGY STUDENTS IN ZARIA-NIGERIA, FOR SCIENCE EDUCATION ADVANCEMENT IN THE 21ST CENTURY.

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Abstract
Science process skills (SPS) acquisition and creativity development are two interrelated cognitive constructs that constitute the very important 21st century skills. These constructs are emphasized by the secondary school Biology curriculum but most students are found wanting in mastering and applying them for coping with contemporary challenges and advancement in science education. Therefore, this study examines the influence of science process-skills acquisition on Biology students' creativity development among secondary schools in Zaria Education Zone, Kaduna State, Nigeria. A sample of 576 Biology students (292 males and 284 females) from 6 schools selected from 30 schools in the study area through stratified random sampling participated in the study. The study employed an Ex-Post Facto research design. Instruments used for data collection were Test of Science Process Skills in Biology (TOPSB) and Ibadan Creativity Assessment Scale (ICAS). Data collected were analysed using Pearson Product Moment Correlation (PPMC) and Simple Linear Regression statistics. Results obtained showed that SPS acquisition significantly correlated with the overall creativity development as well as with each component of creativity among secondary school Biology students. Findings also revealed that SPS acquisition is a significant predictor for both overall creativity and each component of creativity among secondary school Biology students. It is therefore recommended that for advancement in science education and Biology education in particular, secondary school teachers should emphasize SPS acquisition and creativity development over mere content delivery through frequent exposure of students to hands-on and minds-on activities in the form of laboratory experiments and field-work among others.

Keywords: Curriculum, Science Education, Creativity, Science Process-Skills, 21st Century.

Introduction
A curriculum as defined by Adeoye and Raimi (2006) is an educational programme planned for a specified level of an academic institution. Dada in Olagunju (2010) sees it as a programme of learning planned for a target group of learners for a specific period of time in order to achieve certain predetermined educational goals. It therefore follows that it is the curriculum that is

translated into students' learning experiences in the classroom. Hence, if any appreciable progress must be made in advancing science education in the 21stcentury, the science curriculum especially at the Senior Secondary School leve lmust be designed to not only emphasize but prioritize the development Science Process Skills (SPS)and scientific creativity among students (Karadan & Hameed, 2016; Animasahun & Akinade, 2014; Aktamis & Ergin, 2008).This is because according to Akpan(2018),these cognitive constructs constitute the highly invaluable 21st century skills and are prerequisites for innovation and problem solving in the contemporary society.

The main goal of science and technology curriculum according to Aslan (2015) is to raise scientifically and technologically literate students. Scientific literacy is the ability to understand and explain natural phenomena as well as apply such knowledge in matters of everyday life. Therefore, achieving the aforementioned goal would require that the roles of science teachers, students and the curricula are not underestimated. Karadan and Hameed (2016) emphasized that among this triad, the curriculum plays a pivotal role as it enhances the efficiency of teaching and learning if well designed and implemented. Coincidentally, the recent reform in the Nigerian senior secondary Biology curriculum by the Nigerian Educational Research and Development Council (NERDC, 2012) emphasized the aspects of conceptual thinking and laboratory skills development. These according to Aktamis and Ergin(2008), are alternate forms of creative thinking and SPS acquisition which are both components of scientific literacy.

Creativity is defined by Mumford in Animasahun and Akinade (2014) as the process of producing something that is both original and worthwhile. Along the same lines, Abraham (2015) sees creativity as the singularly complex human capacity to produce novel ideas, generate new solutions and express oneself in a unique manner. Creativity according to Rababah (2018) has three components which include fluency, flexibility and originality. Fluency refers to the ability to generate new and relevant ideas; flexibility is the ability to generate a wide variety of ideas while originality is the ability to produce unusual, unique or highly personal ideas or solutions. This, according to Akpan (2018), indicates that creativity is crucial for coping with the rapidly changing world driven by advances in science and technology. However, Olorukooba and Lawal (2010) noted that students can only learn to think creatively if schools concentrate on teaching 'how' rather than 'what' to think. Such could be achieved in the classroom through hands-on, minds-on activities wherein students acquire, master and apply the SPS. Hence, for science teaching to encourage creativity, it must also emphasize the acquisition of SPS.

Science Process Skills (SPS) according to Mutlu and Temiz (2013) are rational and logical thinking skills used in science and which are reflective of the behaviour of scientists. Karadan and Hameed (2016) also stated that they are thinking skills that are used to create knowledge, reflect on problems and formulate logical solutions to problems. This could be why Ongowo(2017)emphasized that most of the contemporary science education curricula recognize SPS as important tools in the construction of scientific knowledge and the development of creative thinking as well as problem solving skills for a functional living. The SPS as noted by Aziz and Zain(2010),have been broadly categorized into two, namely: Basic and Integrated SPS. These skills according to Karadan and Hameed (2016), collectively facilitate students' learning abilities, promote their creativity development and make them competent in the methods of science.

One of the main objectives of the senior secondary Biology curriculum according to NERDC (2012) is to inculcate in students the ability to acquire adequate laboratory and field skills. These skills in effect are the SPS. The Biology curriculum further emphasized creativity in its stipulation that secondary school Biology teaching should prepare students to acquire the ability to apply scientific knowledge to everyday life. However, studies like Ogunyemi (2010) and Saadu (2012) have shown that the creativity level of students in Nigerian Senior Secondary Schools is low. This is by no means contributing to the advancement of science education in the 21st century. Ongowo (2017) have asserted that SPS acquisition and creativity development may be mutually reinforcing and that the acquisition of SPS could be a precursor to the development of creative abilities. Therefore, this study seeks to examine the relationship between SPS acquisition and creativity development among Senior Secondary School students. It also aims at determining the influence SPS acquisition may have on both students' overall creativity and each component of creativity among Senior Secondary Schools in Zaria Education Zone, Kaduna State, Nigeria.

Null Hypotheses

The following null hypotheses were formulated and tested at $P < 0.05$ level of significance:

HO_1: Science process-skills acquisition does not significantly correlate with overall creativity development among secondary school Biology students.

HO_2: Science process-skills acquisition does not significantly correlate with each component of creativity among secondary school Biology students.

HO_3: Science process-skills acquisition does not significantly predict (or contribute to) overall creativity development among secondary school Biology students.

HO_4: Science process-skills acquisition does not significantly predict (or contribute to) each component of creativity among secondary school Biology students.

Methodology

This study adopted a quantitative approach with ex-post-facto research design. This is because the study does not involve the manipulation of variables. In this study, the independent variable (i.e. science process-skills acquisition) and dependent variable (i.e. creativity) are already existing phenomena. The researchers only seek to measure and compare the variables for the purpose of making inferences about their relationship and prediction effect.

The target population for this study consists of all SS3 students offering Biology in the 30public Senior Secondary Schools in Zaria Education Zone of Kaduna State, Nigeria. There are 20 coeducational, 5 male-only and 5 female-only schools in the study area. The schools have a total of 5,693 SS3students consisting of 2,888 male and 2,805 female students (Zaria Zonal Education Directorate, 2019).Stratified random sampling technique was used to select 6 schools from the zone, comprising 4 coeducational schools, 1 male-only school and 1 female-only school. This was to ensure that the school-type with the greater number (i.e. co-educational schools) has a proportionately greater probability of being chosen as part of the sampled schools. The sample used for the study is576 Biology students of which 292 (50.7 %) are males and 284 (49.3%) are females. Intact classes from the selected schools were used to avoid disruption of school organization. The selection of 576 students is appropriate for this study as it meets the one-tenth mark (or 10%) of the total population size as recommended by Krejcie and Morgan (1970) and Kathuri and Pals (1993). Two instruments were used in this study for data collection. They include:

i. Test of Science Process Skills in Biology(TOPSB); and
ii. Ibadan Creativity Assessment Scale (ICAS).

The Test of Science Process Skills in Biology (TOPSB) was adapted from Ajagun (1998) and used to assess students' acquisition of the process skills in Biology. The instrument measured 6 science process skills including 4 basic and 2 integrated science process skills. The basic process skills measured include observation, classification, measurement and recording/communication while the integrated process skills include experimenting and interpretation. TOPSB is an alternative-to-practical test that consists of 9 items and was scored using the marking scheme developed by Ajagun (1998). The instrument was given for validation to four experts in the Department of Science Education and the Department of Educational Psychology, Guidance and Counselling, Ahmadu Bello University, Zaria. Two Biology teachers in Demonstration Secondary School, A.B.U. Zaria, each with at least B.Sc. (Ed) Biology and five years teaching experience were also included in the panel of validators. Their observations, suggestions and recommendations regarding the face, content and construct validity of the test items were noted to produce the final version of each instrument.

TOPSB was pilot tested with 51 SS3 students (41 males and 10 females) in one of the public Senior Secondary Schools in the study area which was not part of the sampled schools. The average time for the completion of the instrument is 40 minutes. The reliability of TOPSB was determined using test-retest method and its coefficient estimated using Pearson Product Moment Correlation (PPMC) statistic. The reliability coefficient of TOPSB was found to be 0.72 indicating a high and acceptable correlation according to Charles (1998).

Ibadan Creative Assessment Scale (ICAS) was developed by Akinboye (1976) and was revalidated in2001. It is a battery of tests tapping certain creative patterns of behaviour. The test has two broad sections. The first has some items in form of statements to which the subject is expected to indicate on a ten-point scale the extent to which he/she agrees with each statement while the second contains questions that demand the subject to show his/her creative behaviour through his/her responses. The first section was adopted in this study. It comprises four sub-scales namely: A (Ideative fluency); B (Ideative originality); C (Ideative flexibility) and D (Ideative motivation).

Akinboye (1976) used a sample of two hundred (200) subjects for each of the sub-scales as the psychometric properties of test construction. Thus, a subject with high scores in each of the subsections A, B, C, D indicates a high creative ability. Furthermore, a score of seventy (70) on any scale indicates a minimum acceptable creativity in an individual. Akinboye (1976)reported a construct validity of co-efficient alpha of 0.76 forideative fluency; 0.71 for ideative originality; 0.64 for ideative flexibility; and 0.77 for ideative motivation. Test-retest reliabilities for each section after a period of four weeks fielded as follows: Fluency scale (A) $r = 0.79$; Originality scale (B) $r = 0.77$; Flexibility scale (C) $r = 0.72$; and Motivation scale (D) $r = 0.85$. Moreover, a face validity was ensured for each scale through item selection process. While the convergent construct validity within the scales were as follows: Ideative flexibility with originality (r) = 0.73; Originality with fluency (r) = 0.87; and Originality with creativity motivation (r) = 0.73.

Data Collection and Procedure for Analysis

A formal introduction letter from the Zonal Education Directorate was issued by the researchers to the principals of the selected schools to permit their students to be used as respondents for this study. The students were addressed by the researchers alongside their Biology teachers to elicit their cooperation and diligence in responding to the instruments. The respondents were given the opportunity to clarify necessary issues as well as assured of the confidentiality of their responses. These were done with a view to enhance response rate and reduce anxiety and subjectivity, which may interfere with the results of the study. The data collected were analysed using inferential statistics of Pearson Product Moment Correlation (PPMC) to test null hypotheses 1& 2 and Simple Linear Regressionto test the null hypothesis 3& 4at $P < 0.05$ level of significance. Analysis was done using the application software "Statistical Package for Social Sciences (SPSS) version 20.0".

Results

The results of this study are presented as follows:

HO_1: Science process-skills acquisition does not significantly correlate with overall creativity development among secondary school Biology students.

Table 1:Pearson Correlation between Students' Science Process-Skills Acquisition and Overall Creativity Development.

		Process Skills Acquisition	Creativity Development
Process Skills Acquisition	Pearson Correlation	1	0.74^{**}
	Sig. (2-tailed)		0.000
	N	576	576

** Correlation is significant at the 0.01 level (2-tailed).

Table 1shows a coefficient (r) of 0.74 and a p-valueof0.000indicatingthat there is a strong positive and significant relationship between students' science process-skills acquisition and their overall creativity development. This deduction is based on the fact that the coefficient (r) is close to the +1 mark and the p-value is less than 0.05. Hence, the null hypothesis is rejected.

HO_2: Science process-skills acquisition does not significantly correlate with each component of creativity among secondary school Biology students.

Table 2: Pearson Correlation between Students' Science Process-Skills Acquisition and Each Component of Creativity.

		Process Skills Acquisition	Ideative Fluency	Ideative Originality	Ideative Flexibility	Ideative Motivation
Process Skills Acquisition	Pearson Correlation	1	0.73^{**}	0.74^{**}	0.73^{**}	0.73^{**}
	Sig. (2-tailed)		.000	.000	.000	.000
	N	576	576	576	576	576

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2 shows a coefficient (r) of 0.73 between SPS acquisition and ideative fluency; a coefficient (r) of 0.74 between SPS acquisition and ideative originality; a coefficient (r) of 0.73 between SPS acquisition and ideative flexibility and a coefficient (r) of 0.73 between SPS acquisition and ideative motivation. The p-value for each of the components of creativity is0.000. These indicate that SPS acquisition correlates strongly, positively and significantly with each of the components of creativity. The deduction is based on the fact that the coefficient (r) for each component of creativity is close to the +1 mark and the p-value for each is less than 0.05. Hence, the null hypothesis is rejected.

HO_3: Science process-skills acquisition does not significantly predict (or contribute to) overall creativity development among secondary school Biology students.

Table 3: Linear Regression of Overall Creativity Development on Science Process-Skills Acquisition.

R= 0.743
R^2 = 0.553
Adjusted R^2 = 0.552
Standard Error = 27.62832

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	541032.182	1	541032.182	708.784	.000
1	Residual	438148.145	574	763.324		
	Total	979180.326	575			

Model is Significant at p < 0.05

Table 3 shows a p-value of less than 0.05, indicating that the regression model is significant ($F(1,574) = 708.784$, $p = 0.000$). This implies that the independent variable (i.e. SPS acquisition) significantly predicts (or contributes to) the dependent variable (i.e. creativity development). The extent of contribution is indicated in the Adjusted R^2value which is 0.552. This implies that 55.2% of the variance in students' creativity development is accounted for by their SPS acquisition. Hence, the null hypothesis is rejected.

HO_4: Science process-skills acquisition does not significantly predict (or contribute to) each component of creativity among secondary school Biology students.

Table 4: Linear Regression Summary of each Component of Creativity on Science Process Skills Acquisition.

Creativity Components	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig	Remark
Ideative Fluency	.733	.538	.537	7.13200	668.324	.000	Significant
Ideative Originality	.739	.546	.545	6.98628	691.096	.000	Significant
Ideative Flexibility	.725	.526	.525	7.29710	637.375	.000	Significant
Ideative Motivation	.731	.534	.533	7.14392	658.256	.000	Significant

*Predictor(s): (Constant), Process Skills Acquisition.
Model is Significant at p < 0.05

Table 4 shows that the p-value for each of the creativity components is less than 0.05, indicating that the regression model is significant for each component of creativity. This implies that SPS acquisition significantly predicts (or contributes to) each of the creativity components. The extent of contribution is shown in the Adjusted R^2 values which are 0.537 for ideative fluency, 0.545 for ideative originality, 0.525 for ideative flexibility and 0.533 for ideative motivation. These imply that 53.7% of the variance in ideative fluency, 54.5% of the variance in ideative originality, 52.5% of the variance in ideative flexibility and 53.3% of the variance in ideative motivation is explained by the students' SPS acquisition. Hence, the null hypothesis is rejected.

Discussion

From Table 1 and 2, it is evident that SPS acquisition correlates strongly, positively and significantly with the overall creativity of secondary school Biology students as well as with each component of creativity (i.e. fluency, originality, flexibility and motivation). This means that an increase in students' SPS mastery would result in a corresponding increase in their level of creativity. This finding affirms the assertion of Ongowo (2017) that science process skills acquisition and creativity development may be intertwined, interrelated and mutually reinforcing. The finding also corroborates that of Olatoye and Oyundoyin (2007) which indicates that cognitive constructs such as intelligence quotient, creativity and science process skills acquisition are positively and significantly correlated among adolescents. However, the findings of Olatoye, Akintunde and Ogunsanya (2010) indicated a negative but insignificant relationship between creativity and students' academic achievement.

Table 3 and 4 clearly revealed that SPS acquisition is a good predictor of secondary school Biology students' overall creativity development as well as all the components of creativity. The degree of contribution of SPS acquisition to creativity development is also high (i.e. more than 50% for overall creativity and each creativity component). This attests to the cause-effect relationship between SPS acquisition and creativity development. The finding confirms the statement of Ongowo (2017) that the acquisition of science process skills is a precursor to the development of creativity, critical thinking and problem solving skills. It also agrees with the findings of Aktamis and Ergin (2008) which revealed that SPS improves scientific creativity and activities involving SPS acquisition can be used to improve students' scientific creativity. Lee and Lee (2002) found an increase in students' creative thinking skills when SPS training was done by simple and creative activities. Lin, Hu, Adey and Shen (2003) reported a significant increase in students' creativity when activities were directed by SPS training. Olatoye and Oyundoyin (2007) also reported that students' I.Q. both significantly predicted their overall creativity as well as each component of creativity. On the contrary, Olatoye, Akintunde and Ogunsanya (2010) revealed from their findings that creativity does not significantly predict academic achievement of students.

Conclusion

The study revealed that science process skills acquisition is significantly correlated with the overall creativity development as well as with each creativity component of secondary school Biology students. This correlation is positive and strong. The study also showed that science process skills acquisition is a relevant predictor for overall creativity as well as each component of creativity among secondary school Biology students. It is therefore hoped that the knowledge this would spur appropriate curricular reforms and implementation strategies that would prioritize SPS acquisition and by that, promote creativity development, among senior secondary school science students.

Recommendations

Based on the findings of this study, the following recommendations are made:

i. The NERDC should integrate more experiments into the secondary school science curricula that would aid students' acquisition of SPS and thus contribute to the development of their potentials for creative thinking and problem solving.

ii. Secondary school Biology teachers should emphasize SPS acquisition and creativity development over mere content delivery through frequent exposure of students to hands-on and minds-on activities in the form of laboratory experiments and field works.

iii. Secondary school Biology teachers should encourage their students to develop enthusiasm in actively participating in activities directed towards the acquisition of SPS as this will go a long way to promote their overall creativity development.

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FACTORS AFFECTING THE IMPLEMENTATION OF PRE-SCHOOL SCIENCE CURRICULUM IN NIGERIA

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Abstract
Curriculum implementation entails putting into practice the officially prescribed course of study. Effective curriculum implementation results in both short and long term benefits to children and eventually the entire society. The importance of pre-school science education in the development of an individual in order to contribute to the technology, science and economic development in Nigeria cannot be overemphasized. This paper examined factors affecting the implementation of pre-school science curriculum in Nigeria. The paper established that majority of pre-school centers do not have science teaching and learning resources, inappropriate teaching methods, Poor qualification of teachers among others thus having negative effect on the implementation of the pre-school science curriculum. Consequently upon the above, the paper recommends that, government, administrators and stakeholders should search for ways of mobilizing financial resources for the provision of teaching and learning materials as well as logistics support to ensure that minimum standards are maintained in both public and private pre-school institutions in Nigeria.

Keyword: Pre-School, Pre-School Science, Curriculum, Curriculum Implementation.

Introduction
Pre-school forms the foundation of education of the child in majority of countries across the world, hence the need to develop children holistically (Ntumi, 2016). The paramount importance of the early years is widely acclaimed in various international documents and developmental goals such as United Nation Convention on the Right of the Child, African Charter on the Right and Welfare of the Child, Sustainable Development Goals (SDGs) and Education For All (EFA) goals among others (Akinrotimi & Olowe, 2016). Manduku, Ruto and Maritime (2017) informed that childhood education is crucial in the life of a child because it lays the foundation for intellectual and physical development. In Nigeria early childhood serves the critical purpose of preparing young children for primary education. Pre-school programme in Nigeria serves children 0-5 years old.

Pre-school curriculum implementation entails putting into practice officially prescribed courses of study, syllabus and subject. The process involves helping the learner acquire knowledge or experience. It is important to note that curriculum implementation cannot take place without the learner. The learner is therefore the central figure in the curriculum implementation process. Implementation takes place as the learner acquires the planned or intended experiences, knowledge, skills and attitudes that are aimed at enabling the state learner function effectively in a society (Ntumi,2016).

Preschool education is getting attention among the nations of the world (UNESCO, 2012). Being (2009) observed that pre-school science is enjoying renewed attention in the United States and attempts are being made to improve scientific literacy and achievement among the nation's citizens. During the National Teachers Science Association Congress held in Arlington city, North America, the participants reported that the teaching of science in pre-school has not been given maximum attention and they reconsidered that more professional development should be injected into early childhood science (Mckomark, 2010). Research studies carried out in Florida showed that school readiness in science lags behind other domains at least among learners (Kimberly, 2011). This shows that, the teaching of science in preschool is not comprehensive.

According to Torkington (2002) the African governments allocate very small budgets to Early Childhood Development and Education programmes. Preschool education in Africa is mostly managed by communities, religious institutions and local government unlike the primary schools. Kipkosger (2016) found that teaching in pre-school in Botswana, Kenya, and other African countries like Nigeria are faced with a lot of challenges. The relevance and quality of curriculum implementation has been a concern to all stakeholders. According to UNICEF report (2007), there are complaints in early childhood development centers on continued neglect as far as the teaching of preschool science is concerned. This has been due to many factors influencing the implementation. This paper examined how various factors affect the implementation of preschool science curriculum in Nigeria and identifies strategies for enhancing the effective implementation of pre-school science curriculum in Nigeria.

Meaning of Pre-School

There are different names for the various establishments that take care of children at this stage. The terminology of pre-school varies from countries. In some countries, the term refers to nursery, Kindergarten, Crèches, Daycare, Play-group, Pre-primary, or Early Childhood Education. According to Maduewesi (1999), they are all forms of early childhood education that offered to children who have not yet reached the statutory age of beginning primary school. He further maintained that it is semi-formal education arrangement, usually organized outside the home where by young children of 3 years and above are exposed through play like activities in a group setting through mental social and physical learning suited to their development stages, until the mandatory age of government approved formal schooling. Federal Republic of Nigeria (FRN, 2004) refers to pre-school education as an education given in an educational institution to children 3-5 years plus, prior to their enrolment in the primary school. Pre- school is more than a preparatory stage assisting the child's transition to formal schooling. It places emphasis in developing the whole child- attending to his or her social, emotional, cognitive language and physical needs –to establish a solid and broad foundation for lifelong learning and well-being.

Meaning of Curriculum and Curriculum Development

Curriculum issues, either in an explicit or an implicit manner, are inextricable linked to current thinking and action on educational concerns and reforms around the world. Experiences of educational reforms almost all over the world have shown that curriculum is at the same time a policy and a technical issue, a process and a product involving a wide range of institution and actors (Ajibola, 2008). The curriculum provisions are immense and profound for school teaching and learning (Ajibola, 2008). The process of constructing the curriculum is unique to each national setting. It is a complex outcome of the opinions and solutions that key stakeholders propose for society's requirements and needs.

The term curriculum has been defined by many people in many places. One cannot talk precisely of right or wrong definitions. Curriculum is a vehicle through which education is attained (Offorma, 2005). This Offorma's definition is a narrow view of curriculum. The broad definition of curriculum sees it as a process, that is the package and the continuous work involved in bringing the package into being, the thinking curriculum serve the needs of society (Obayan, 2004). The totality of the syllabuses of activities carried out under the supervision of schools, in response to society is an example of the broad definition of curriculum.

Meaning of Curriculum Implementation

Curriculum implementation is the translation of what has already been documented theoretically into practical terms. It is the task of translating the curriculum document into the operating curriculum by the combined efforts of the students, teachers and others concerned (Modibbo, 2008). Ivowi (2004) described curriculum implementation as the translation of theory into practice or proposal into action. It is putting the curriculum into work for the achievement of the goals for which the curriculum is designed (Garba, 2004). Bobalola (2004) defined curriculum implementation as the multifarious activities of translating a complex curriculum conception in the form of a design or plan into new patterns of practical actions useable and realizable in a teaching leaning milieu. It is the translation of the objectives of the curriculum from paper to practice (Okebukola, 2004). This implies that curriculum implementation connotes putting what have been planned into action.

Curriculum Content of Pre-School

The curriculum at the preschool level according to Hangasani (2016) is broad, and the range of subjects offered is quite wide. It focuses on English language, mathematics (arithmetic), Nigerian languages, writing, reading, rhymes, social studies, music singing and elementary science/nature study. At this level, 30-minute periods per week are devoted to the teaching of English and it is the maximum number of weekly periods for any subject. Another subject that is prominence in the preschool programme is mathematics/arithmetic for which five periods are allocated to this subject per week. On the average, children spend 30-minute periods every day learning mathematics. Topics like counting, recognition of numbers addition and subject are also taught. This gives an important start in the acquisition of numeracy.

Similarly, three periods are allocated to each of these subjects: moral and religious instruction, writing, reading, drawing, rhymes, elementary science/nature study, social studies, handcraft and music/singing. Moreover, two periods are allocated to the local language. On the average, instructional time consists of twenty-eight teaching periods per week. The medium of instruction at this level is principally the mother tongue, or the language of the immediate community. The evaluation system is essentially based on continuous assessment. Continuous assessment is conceived as a cumulative record of the child's performance in various fields throughout his or her school career obtained through test, quizzes and so forth.

Curriculum Guidelines for Pre-School Science

The Nigerian curriculum content of Early Childhood Care Development and Education (ECCDE) prepares children for further education especially the primary education. To find out the adequacy and effectiveness of the ECCDE curriculum in preparing children for primary education, the research reviewed the National Educational Research Development Council (NERDC, 2008), curriculum guidelines with specific reference to mathematics, language and communication; scientific and reflective thinking; physical and health education; and creative arts. However, for the purpose of this paper we shall highlight on mathematics, scientific and reflective thinking with materials to support it learning. NERDC (2008) further stated thus:

Mathematics Skills: These are skills that enable children at the age of three (3) years to be able to recognize and name primary colours and shape; sort by colours and shape; recognize and number symbols from 1 to 5 and count up to 10. To achieve the objectives, the teaching aids required are number cards beads, bead frames, bricks, bottle tops, used match sticks, seeds, counting sticks and so on, number of songs, rhymes stories and games.

At the age of four (4) years, the children should be able to build on the educational gain made at the 3 years old level, count to 50; identify number symbols from 1 to 20; and do simple addition using the number symbol 1 to 50. The teaching aids required at their level for the attainment of the stated objectives are sticks, bottle tips, stones, seeds, desks, chairs, tables, pencils, books, cups, toys, and so forth. Others are picture-matching cards showing one-to- one correspondence, measuring tape, buckets, cups, bowls, water, sand so on.

At the age of five (5) years, children should be able to build on the educational gains made at 4-years old level by courting up to 100; identifying number symbols from 1 to 50; doing simple addition and subtraction using the number symbols 1 to 9; and reciting the days of the week. To achieve the objective teaching aids required are charts, diagrams, number cards, simple mathematics book and calendars.

Scientific and Reflective Thinking: The objective according to NERDC (2008), as it affects children aged three (3) years is to enable them to observe nature, for example, flowers, leaves, animals, the sun, clouds, rain, the moon, and stars should be provided as teaching aids.

On the four (4) years old, the objective are to enable them build on the educational gain made at the 3 year old level; and demonstrate awareness about nature. The teaching aids needed to achieve the objective are school ground that should provide opportunities for the study of nature; and a science corner that should be well stocked with specimen of animals, plants, birds, insects, fish and paper boats, wood, stones and so forth.

In the case of children age five (5) years, the objectives are to build on the education gains made at the 4-years old level; identify living and non-living things and observe their characteristics, and carry out simple experiments and make observations and name a few machines used for transport and name some machines used in the home and on the farm. The teaching aids required are the materials for the children to carryout simple experiments, real specimens (plants, animals, insects, rocks, pieces of wood, and so on) or pictures and specimens of various types of soil, picture of variety of machines; and class science and nature corner with exhibits clearly labeled.

Implementation Issues of Pre-School Science Curriculum in Nigeria

The objectives of pre-school education are laudable, but there are some challenges that pose a bottleneck to its anticipated success and progress. Some of these challenges are discussed below:

Inadequacy of Science Teaching and Learning Resources

The availability and quality of teaching and learning resources is a key factor in the effective delivery of the curriculum (Steward 2009). Steward further stated that, teaching and learning resources should be planned and utilized in the most effective manner to being about efficient provision are relevance in education. According to Rai and Richardson (2003), the success of any science programme largely depends upon the quality and quantity of materials that can be utilized when needed.

Kathure (2006) observed that, when teaching and learning resources are used appropriately, they assist teachers to add concreteness to their presentation of materials. They also encourage learner's involvement, aid learner in conceptualizing abstract ideals and help understanding, mastery and retention of the ideas or concepts. In addition, if teaching and learning resources are not used, the lesson will be teacher-centered and didactic and pupils will not learn how to work independently and in groups (Right, 2012).

Teaching and learning resources also sharpen learner's power of observation (Mornson, 2007). Pre-school teachers should therefore use adequate science apparatus and materials in every science activity lesson to facilitate the learning of science. Teaching and learning materials attained to provide children with real life experiences and opportunity for them to use their full senses (Touch, Sight, Smell, Hear, Feel,) to enhance learning (Rai & Richardson, 2003).

Teaching Methods Used in Teaching Science in Pre-School

According to Quist (2000), pupils learn effectively if the teacher uses a variety of child-centered methods. Ayot and Achieng (2009) concurred with Steward (2009) that preschool teachers should use a variety of child centered methods to facilitate learning in pre-school. Hong and Diamond (2012) also argued that the types of teaching learning approaches used in teaching young children science affect children's science outcome. Kathure (2010) recommended that participatory methods such as experimentation, demonstration, field trip and project should be used in teaching science because they enable the learner to acquire process skills, enjoy learning and apply what is learnt to everyday life.

Rotumoi and Too (2012) observed that availability and adequacy of space and number of learners in the class influence the choice of teaching methods. They further noted that the choice of teaching method has an impact on the child's learning and subsequent development. NPE (2004) also recommended play-way and discovery method as suitable for teaching in the preschool. It is therefore, necessary they presented teacher use a variety of child-centered teaching methods to teach science activities in preschool.

Poor Quality and Qualification of Preschool Teachers

The quality of the teacher determines the strength and success of any educational system and curriculum implementation (Okori, 2004). In Nigeria, early childhood institution today, the teacher quality is generally low. It is only a few of the pre-school especially those owned by educational institutions, private companies and wealthy individuals that can afford to engage the service of university graduate teachers and holder of Nigerian Certificate in Education (NCE) qualifications, competent and committed teachers and are also capable of retaining such teacher (Tombowua, 2013).

Most others, employ a few NCE teachers (if any at all), who are usually underpaid, while other employ mainly Grade Two Teachers and Secondary School Leavers with School Certificate or General Certificate (ordinary level) qualification. In a situation where most of the teachers in our pre-schools are unqualified and/or unprofessional, effective implementation of pre-school science curriculum cannot be achieved.

Poor Supervision and Negligence of Pre-School on the Part of Government

Of all the measures that Federal Government undertook in order to facilitate the achievement of the objective of early childhood education, the only one it has effectively accomplished is the granting of permission for private efforts in the provision of early childhood education in the country with virtually less or non participation by the public sector. This in addition to lack of supervision to ensure the maintenance of standard has led to increases in number of pre-school institution in the country (Obidike, 2012), thereby resulting to offering substandard and irregular education that cannot breed self-reliant and successful individuals of the society (Tombowua, 2013).

No educational plan however excellent it may be can be effectively implemented if the school supervision is ineffective. The issue of supervision is vital in the process of implementing pre-school science curriculum in Nigeria if success is to be attained. There is the need to point out that laudable programmes with adequate facilities will eventually crumble if there is no supervision. Ogunsaji (2006) identified supervision as an indispensable management key of any organization or organizational programme. This then means that supervision should be a necessary integral part of pre-school programmes so that goal(s) may be achieved.

Supervision needs to be tailored towards constructive criticism and guidance so as to developed sense of confidence and competence in pre-science teachers, thereby to improvement. In this way, regular and appropriate supervision in pre-school will help in evaluating the programme as well as in decision making processes (Tombowua, 2013)

Non availability of Pre-School Curriculum

Pre-school curriculum is an important written plan that includes goals for children's development and learning, experiences through which they will achieve the goals, what staff and parents do to help children achieve the goals and the materials needed to support the implementation of the curriculum (National Centre on Quality Teaching and Learning (NCQTL, 2012). The pre-school curriculum helps to ensure that staff or teachers cover important learning areas adopt a common pedagogical approach and reach for a certain level of quality across age groups. These descriptions about pre-school curriculum indicate that it is an indispensable material in the business of implementing pre-school programme. It's indispensability spurred the government of Nigeria to see to the development and production of National Early Childhood Curriculum for age 0-5years by National Educational Research Development Centre (NERDC), with the support of UNICEF. This curriculum was launched in 2007. The unfortunate thing however is that this curriculum, since it was launched, is not found in almost all pre-schools in Nigeria (Akinrotimi & Olowe, 2016). This is particularly true of privately owned schools. The non-availability of the National Early Childhood Curriculum for ages 0-5 years in pre-schools has seriously affected the implementation of pre-school science curriculum in Nigeria.

Teacher: Pupil Ratio Syndrome

The teacher-pupil ratio of 1:25 with a helper/an assistant stated in the National Policy on Education (FGN,2004) for the pre-school class is likely to be a problem in the sense that the developmental characteristics and the needs of the preschoolers have not been considered. The children at this level are so restless, extremely active and full of energy to expend. They are still dependent on adults for almost all their basic needs physical, intellectual language, emotional and social skills and therefore they require their full attention and diverse activities to help satisfy their basic needs. It is not yet clear how smaller class sizes influence the quality of teaching of science in such centers. The center for Early Childhood Development and Education (2012) condemned a similar practice in Ireland, and stated that, such a practice is unfavorable to child initiatives or to individual attention being given to the children (even in the part of the teacher, it would be frustrating and extremely different to achieve any worthwhile work) Tassoni, Beith and Gough (2005) then suggested a ratio of 1:4 for ages three and a ratio 1: 8 for ages four to six as providing for adequate individual attention to every child in the class and hence, aiding optimal development of the children. If the ratio is not feasible in Nigeria it would probably be result of a shortage of manpower. The highest ratio for this level ought not to exceed 1:15 with one assistant or 1:25 with two assistants.

The Unwillingness to use Mother-Tongue as a Medium of Instruction in Pre-School

In the National Policy of Education, it has stipulated that even at pre-school level, the mother tongue or the language of the immediate environment should be used as a language of instrument. Parents have been favorably disposed to this issue, since they seem to believe that ability to communicate fluently in English is one of the reasons why parents send their children to pre-schools. It has been established by scholars that education in the mother tongue is more effective and relevant to the needs of young children. Globally, it is posited that initial education in the mother tongue facilitates second or foreign-language learning (Ajayi, 2008). Afolayan (1970) also said that the more accurate a child's knowledge is of his/her own language, the most efficient and adequate his/her translation to English (as a second language) will be.

One problem associated with teaching in the mother tongue is that there are no sufficient books for children at this level to interact with. The majority of those available are foreign-based and expensive, making them unaffordable and not readily available to these children. The few home-based books that are available are of low quality, making them unappealing and unattractive to read and use even in the teaching of pre-school science. There are virtually no books for pre-school science for this range of children's indigenous language (Ajaiyi, 2007). It therefore becomes a great challenge in the implementation of pre-school science curriculum in Nigeria.

Conclusion and Recommendations

There is no doubt about the fact that, the implementation of pre-school science curriculum in Nigeria is faced with diverse challenges. However, what needs to come to mind is that there is no problem without solution. This is to say that, there are ways out of these challenges. This paper therefore proffers recommendations that can indeed, if implemented can successfully address these challenges.

1. Pre-school owners both public and private should consider and maintain the in service training programme to pre-school teachers to induct them on the current practices of teaching science, for example, scientific method of teaching science.

2. Pre-school teachers should embrace the practice of implementation and make their own science teaching learning resources, learning corners using locally available materials.

3. The government through the relevant ministries and private school owners should consider in service programme for pre-school teachers on the methodology of teaching pre-school science.

4. The school administrators, the school management committee and the stakeholders should look into ways of mobilizing financial resources for constructing more classrooms with sufficient storage space for teaching and learning resources.

5. Effective quality monitoring units should be set up by ministries of education and provide with necessary logistic support to ensure that minimum standards are maintained in both public and private pre-school institutions in Nigeria.

6. Regular supervision and monitoring with stiff penalties for offenders will help to maintain the teacher-pupil ratio of 1:20.

7. Government should resort to using the internet to upload unto the website of UBEC and make available copies of the Early Childhood Curriculum for Ages 0-5years to all preschools. It should be made mandatory for all pre-schools, both public and private to ensure that the curriculum is available and used in the school.

8. Pre-school owners both public and private should employ more professionally qualified pre-school teachers.

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IMPACT OF CONVERGENT AND DIVERGENT LEARNING STYLES ON CHEMISTRY ACHIEVEMENT AND MOTIVATION AMONG SECONDARY STUDENTS IN BIDA LOCAL GOVERNMENT, NIGER STATE

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Abstract

This study investigated the impact of convergent and divergent learning styles on Chemistry achievement and motivation among secondary school class II Chemistry students in Bida local government, Niger State. The study employed causal comparative (Expo factor) research design using pretest posttest non randomized control group design. Population of study consists of 1620 (1124 male & 496 female) Chemistry students from all the 8 government secondary schools in Bida local government area of Niger state. Sample size for the study consists of 210 (117 male & 93 female) students using an intact class of 3 out of 8 government secondary schools randomly selected by lottery technique. The instruments used for data collection were Chemistry Achievement Test (CAT), Questionnaire on Chemistry Students Motivation Towards Learning of Electrolysis (QCSMLTE) and Chemistry Students Learning Style Inventory (CSLSI) respectively. Each of the CAT, QCSMLTE and CSLSI were validated by Chemistry and Science Education experts from Federal University of Technology, Minna respectively. Thus, the CAT gave a reliability Coefficient of 0.93 using Guttmann Split half reliability test while QCSMLTE and CSLSI gave a reliability coefficient of 0.84 and 0.76 respectively using Cronbach alpha test. Mean and standard deviation was used to answer research questions raised and Analysis of Covariance (ANCOVA) to test the null hypotheses at 0.05 level of significance. Findings from this study revealed that there was a significant difference between convergent and divergent learning styles on senior secondary school students' achievement and motivation in the concept electrolysis in favor of divergent learners, respectively. Based on research findings for this study, it was recommended that students learning style should be identified and explored frequently by teachers during Chemistry instructions using STAD instructional strategy so as to aid better achievement and motivation in Chemistry among secondary school students.

Keywords: *Convergent and Divergent Learning Styles, Chemistry Achievement, Motivation*

Introduction

Chemistry is one of the core science subject taught in most secondary schools in Nigeria and a basic requirement for admission into science based programmes in higher institutions of learning. Thus, the ultimate aim of Chemistry in every society is to provide people with knowledge of scientific concepts needed for the fulfillment of socio – economic and cultural needs of the society which are but not limited to mining, medicals, automobiles, textile, cement, glass, Brewery, Petrol and Petrochemical industries, respectively (Bichi, 2015 & Balogun, 2016).

Despite the importance of Chemistry, it is disappointing to note that performance of students during internal and external examinations has remained considerably poor as shown in table 1

Table 1: WAEC 2014 – 2018 Niger State Chemistry Result

Year	A1 – C6 (%)	D7 – E8 (%)	F9 (%)	ABS (%)
2014	23.23	33.11	41.88	1.62
2015	21.19	32.79	45.20	0.89
2016	18.32	29.59	50.41	1.63
2017	15.58	27.43	55.30	1.69
2018	10.25	24.24	63.20	2.32

Source: WAEC National Head Quarter, Yaba Lagos (2018)

Table 1, revealed a decrease in percentage pass rate at credit level of 23.23 % to 10.25 % from 2014 – 2018, while percentage failure rate increases from 41.88 % to 63.20 % in 2014 - 2018 respectively. These shows that there is continues poor performance in Chemistry among secondary school students in Niger state from 2014 – 2018, respectively. Thus, this poor performance of students in chemistry has continued to be a major concern, particularly to those in the mainstream of chemical education in Nigeria (Olagunji, Adesoji, Iroegbu & Ige, 2003; Adesoji & Olutunbosun, 2008).

The West African Senior School Certificate Examination (WASSCE, 2014 - 2018)chief examiner's report identified candidates poor performance in chemistry to inability of students to tackle numerical and arithmetic questions, poor expressions, memorization of concept without understanding, writing of half life reaction and incorrect balancing of ionic equations. Moreover, Shedrach, Pascal & Richard (2016) identified the concepts electrolysis, redox reactions and electrochemical cells, as most difficult Chemistry topics among secondary school students. Interestingly, each of these concepts pointed out are rooted from the concept electrolysis. In addition, Bamidele *et al.* (2013) stated that the students were observed to be deficient in understandingionic equations and its application in electrolysis.

Research findings have linked the cause of students' difficulty in electrolysis to quality and quantity of students learning style explored during instructions (Olorukooba, 2001; Eniayeju, 2002; Danjuma, 2005; Novak & Canas, 2008). While some other findings revealed cause of students difficulty in the concept electrolysis to lack of adequate motivation for teaching and learning (Adesoji & Olutunbosun, 2018). Convergent and divergent learning styles have been identified as the most prominent learning styles among secondary school students in Nigeria (Jacobs & Aruwon, 2016).

Convergent learning styles involves the ability of students to understand learning objectives by exploring their sense of touch, taste, sight, smell and hear respectively which defines their attributes of abstract conceptualization and active experimentation during instruction (Ariyo, Bonire & Dhulkifl, 2017). While divergent learning style defines students learning skill potentials associated to reflective observation and active experience related to the lessons objective (Gabriel, Sunday & Mathew, 2017). Motivation is a driving tool or veritable strategy used to regulate an individual's belief, idea, thinking or actions which may be favorable or unfavorable to teaching and learning process (Ezenwa, Rabiu & Oyewo). These implies that when learning environment fails to meet the need of students will mean a manifestation of negative attitude which shows lack of adequate motivation to learning but when learning environment meets students needs will mean a manifestation of positive attitude which shows adequate motivation to learning among students respectively (Njokoku, Ezeugo & Kalu, 2018).

Research findings have shown varying opinions on effects of Convergent learning style on achievement and motivation in Chemistry. Thus, Adams, Odeyemi and Kafewo (2018) revealed that there is a significant difference between Convergent learning styles on motivation and achievement in Chemistry while Haruna, Kabiru and Rufai (2018) revealed that there is no significant difference between convergent learning style on motivation and achievement in Chemistry. Some other findings on Divergent learning styles such as Jacobs and Aruwon (2019) revealed that there is significant difference between Divergent learning styles on motivation and achievement in Chemistry while Babatunde and Seyi (2019) revealed that there is no significant difference between Divergent learning styles on motivation and achievement in Chemistry. Base on divergent findings of learning styles on Chemistry achievement and motivation, the aim and objective of this study are to determine the impact of convergent and divergent learning styles on secondary school students' achievement and motivation in the concept electrolysis. Thus, investigated the impact of convergent and divergent learning styles on Chemistry achievement and motivation among government secondary school students in Bida local government, Niger State.

Research Questions

The following research questions guided the study:

i. What are the effects of Convergent and Divergent learning styles on secondary school students achievement in the concept electrolysis?

ii. What are the effects of Convergent and Divergent learning styles on secondary school students motivation in the concept electrolysis?

Null Hypotheses

The following null hypotheses were tested in the study;

Ho_1. There is no significant difference between Convergent and Divergent learning styles on senior secondary school student's achievement in the concept electrolysis.

Ho_2. There is no significant difference between Convergent and Divergent learning styles on senior secondary school student's motivation in the concept electrolysis.

Methodology

Pretest - Posttest non - equivalent and non - randomized control group causal comparative research design was adopted for this study. The population of study consists of 1620 (1124 male & 496 female) Class II Chemistry students. Sample size of 210 (117 male & 93 female) class II Chemistry students using an intact class of 3 out of 8 secondary schools randomly selected by lottery technique in Bida local government area was used for the study as shown in table 2.

Table 2: Sample of the Study

School	Group	Male	Female	Total
D.S.S Eyagi Bida	Convergent	45	29	74
G.T.C Bida	Divergent	49	40	89
G.D.S.S Bida	Control	23	24	47
	TOTAL	**117**	**93**	**210**

Chemistry Achievement Test (CAT), Questionnaire on Chemistry Students Motivation Towards Learning of Electrolysis (QCSMTLE) and Chemistry Students Learning Style Inventory (CSLSI) were used for data collection. The CAT was developed by first constructing a test blue print for the different content specified on the concept electrolysis to generate 25 multiple choice questions options A - D. the QCSMTLE consist of 30 items on Chemistry students motivation towards learning of the concept electrolysis using a 5 point likert scale of Highly Motivated (HM), Moderately Motivated (MM), Averagely Motivated (AM) and Not Motivated (NM) respectively were scored 5, 4, 3, 2 and 1for positive statements. While negative statements were scored in reverse order.

The CSLSI was adopted to identify students learning style, which consists of 24 items with 6 items drawn from each of the 4 learning skills which are concrete experience, reflective observation, active experimentation and abstract conceptualization, respectively. The CAT, QCSMTLE and CSLSI were validated by chemistry and science education experts each from Federal University of Technology, Minna, Niger State, respectively. A pilot study was carried out using 63 (40 male & 23 female) class II Chemistry students of Government model secondary school, Bosso. The administration of the CAT was done twice within an interval of two weeks.

The CAT, gave a reliability Coefficient of 0.93 using Guttmann Split half reliability test. While the QCSMTLE and CSLSI gave a reliability coefficient of 0.84 and 0.76 respectively, using Cronbach alpha reliability test. Hence, the CAT, QCSMTLE and CSLSI were considered reliable and suitable for the study. The CAT and QCSMTLE were administered to the students in a normal class room setting for pretest scores. Experimental groups were taught the concept electrolysis using STAD lesson plan while control group were taught electrolysis using lecture method. A reshuffled version of the CAT was then administered to the students to measure achievement while CSLSI was used to identify students learning style respectively. The QCSMTLE was then used to collect data on motivation levels of students. The Research period lasted for six (6) weeks. Mean and standard deviation was used to answer research questions raised. However, analysis of variance was used to analyze if pretest result was significant or not. Thus, Analysis of Covariance (ANCOVA) was used to test the null hypotheses at 0.05 levels of significance. The statistical package for social sciences (version 23.0) was used for the analysis.

Results

Table: 3 Summary of ANOVA Pretest Results on Achievement Scores in Chemistry.

	Sum of Square	df	Mean Square	F	Sig
Between Groups	2887.463	11	2 62.497	0.932	0.031
Within Groups	43936.822	156	281.646		
Total	46824.286	167			

Significant at P 0.031

Pretest results presented in table 3 revealed that P value gives 0.031 at 0.05 levels of significance (0.031 0.05). Therefore, there was significant difference between experimental and control groups on pretest scores. This implies that both groups were found to be different before treatment commenced. Hence, the use of Analysis of Covariance (ANCOVA) to test the null hypotheses using pretest results justifies the choice of inferential statistics for the study.

Research Question 1
What are the effects of Convergent and Divergent learning styles on secondary school students' achievement in the concept electrolysis?

Table 4
Mean and Standard Deviation of Students achievement in Chemistry

Group	N	Pretest		posttest		Mean Gain
		X	SD	X	SD	
Convergent	74	27.45	3.12	42.04	4.61	14.59
Divergent	89	25.82	3.87	42.76	4.17	16.94
Control	47	24.12	4.92	26.38	6.35	2.263

Table 4, revealed a pretest result for convergent group having a mean achievement score of 27.45 with standard deviation of 3.12, while posttest result shows a mean score of 42.04 with standard deviation score of 4.61. Hence, had a mean gain score of 14.59 Similarly, pretest result for divergent group revealed a mean achievement score of 25.82 with standard deviation of 3.87, while posttest result gave a mean score of 42.76 with standard deviation score of 4.17. Hence, had a mean gain score of 16.94, the control group pretest results revealed mean achievement score of 24.12 with standard deviation of 4.92, while posttest result gave mean achievement score of 26.38 with standard deviation of 6.35. Hence, mean gain of 2.263.

These, results revealed that both convergent and Divergent learners had higher mean achievement score than control group, but divergent learners had higher mean gain than convergent learners. Thus, to find out how significant the difference was, analysis of covariance ANCOVA was used to test the null hypothesis from research question 1 raised as shown in table 5.

Hypothesis One (Ho_1)

There is no significant difference between Convergent and Divergent learning styles on senior secondary school student's achievement in the concept electrolysis.

Table 5
Summary of ANCOVA Test Results of Groups with Achievement

Source	Type III Sum of Square	df	Mean Square	F_{cal}	P_{value}
Corrected Model	9958.241[a]	3	3319.414	14.685	0.000
Intercept	28667.327	1	28667.327	126.821	0.000
Pretest	536.457	1	536.457	2.373	0.125
Groups	8248.057	2	4124.028	18.244	0.000
Error	46565.573	206	226.046		
Total	373365.000	210			
Corrected Total	56523.814	209			

Significant at 0.05 P

Table 5 revealed that $F_{(2, 206)} = 18.244$ and $P = 0.000$ at 0.05 level of significance. This shows that p value is less than 0.05 (0.00 0.05) which is significant. Therefore, the null hypothesis one was rejected. There is significant difference between Convergent and Divergent learning styles on senior secondary school student's achievement in the concept electrolysis.

Research Question 2

What are the effects of Convergent and Divergent learning styles on secondary school students' motivation in the concept electrolysis?

Table 6: Mean and Standard Deviation of Students Motivation Rate in Chemistry

Group	N	Pre motivation		Post motivation		Mean Gain
		X	SD	X	SD	
Convergent	74	22.45	3.22	55.27	2.37	32.82
Divergent	89	20.82	3.19	54.18	2.53	33.36
Control	47	21.12	4.61	23.15	2.47	2.03

Table 6, revealed a pretest result for convergent group having a mean score of 22.45 with standard deviation of 3.22, while posttest result shows a mean score of 55.27 with standard deviation score of 2.37. Hence, had a mean gain score of 32.89. Similarly, pretest result for divergent group revealed a mean score of 20.82with standard deviation of 3.19, while posttest result gave a mean score of 54.18 with standard deviation score of 2.53, had a mean gain score of 33.36. The control group pretest results revealed mean achievement score of 21.12 with standard deviation of 4.61, while posttest result gave mean achievement score of 23.15 with standard deviation of 2.47, had a mean gain score of 2.03. These, results revealed that both convergent and Divergent learners had higher mean motivation score than control group, but divergent learners had higher mean gain score on motivation than convergent learners. Thus, to find out how significant the difference was, analysis of covariance (ANCOVA) was used to test the null hypothesis from research question 2 raised as shown in table 7.

Hypothesis Two (Ho_2)
There is no significant difference between Convergent and Divergent learning styles on senior secondary school student's motivation in the concept electrolysis.

Table 7: Summary of ANCOVA Test Results of Groups with Motivation

Source	Type III Sum of Square	df	Mean Square	F_{cal}	P_{value}
Corrected Model	36452.765[a]	3	12150.92	245.976	0.000
Intercept	46541.824	1	46541.824	176.104	0.000
Pretest	162.211	1	162.211	0.614	0.434
Groups	34294.971	2	17147.485	64.882	0.000
Error	54442.992	206	264.286		
Total	566991.000	210			
Corrected Total	90895.757	209			

Significant at P 0.000

Table 7, revealed that $F_{(2, 206)}$ = 64.882) and P = 0.000 at 0.05 level of significance. This shows that p value is less than 0.05 (0.00 0.05) which is significant. Therefore, null hypothesis three was rejected. This means that there is significant difference between Convergent and Divergent learning styles on senior secondary school student's motivation in the concept electrolysis.

Summary of findings
The following Submissions are the summary of findings for this study

i. There is significant difference between Convergent and Divergent learning styles on senior secondary school student's achievement in the concept electrolysis in favor of divergent learning styles.

ii. There is significant difference between Convergent and Divergent learning styles on senior secondary school student's motivation in the concept electrolysis in favor of convergent learning styles.

Discussions of Findings
There is significant difference between Convergent and Divergent learning styles on senior secondary school students' achievement and motivation in the concept electrolysis in favor of divergent learners. The finding disagrees with findings of Haruna, *et al* (2018) and Babatunde, *et al* (2019) who revealed that there is no significant difference between convergent learning style on achievement and motivation in Chemistry. These may be attributed to some intervening variables such as Hawthorne effects and study maturation among others which were not taken into consideration accordingly. However, the findings of this study supports earlier findings of Adams *et al* (2018) and Jacobs, *et al* (2019) which revealed that there is a significant difference between Convergent learning styles on achievement and motivation in

Chemistry which revealed that there is significant difference between Divergent learning styles on achievement and motivation in Chemistry in favor of divergent learners.

Conclusion

Convergent and Divergent learning styles improves secondary school students' achievement and motivation in Chemistry.

Recommendations

Based on research findings for this study, it was recommended that students learning Skills or potentials should be identified and explored frequently by teachers during Chemistry instructions using STAD strategy so as to aid better achievement and motivation in Chemistry among secondary school students.

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INTEGRATION OF APPRENTICESHIP SCHEME INTO THE NCE (TECHNICAL) CURRICULUM PROGRAMME TOWARDS SELF-RELIANCE IN THE 21st CENTURY

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Abstract
This paper examined how to integrate apprenticeship scheme into the NCE (Technical) curriculum programme towards the positive realization of self-reliance by its graduates in the 21st Century. The paper exposed the failure of the current TVET programmes in creating employment and wealth creators against seekers of white collar jobs as well as mentioned the unemployment alarming rates amongst our youths. This paper also explains the efforts of the National Directorate on Employment with its seven folds of employment plans which in no doubt failed woefully. This paper is therefore of the view that apprenticeship scheme be integrated into the NCE (Technical) Programme through its curriculum reform drawing from the experiences of priority placed on apprenticeship scheme by developed countries who saw this as a bedrock for industrial and economic revolution some centuries ago. To this end, the paper recommended seven points that can lead to curriculum reforms providing for one full year practical Apprenticeship Scheme training in industries in the second year of the NCE programme while the first and third year be devoted to academic, teaching practice, project work and essential certifications.

Introduction
Currently, Nigeria is passing through a difficult time in her history clouded with political struggles, survival to sustain, economic instability, recession challenges just to mention a few. One of the issues that have being driving our economy to state of constant turbulence is the rising unemployment. An economy with constant increasing unemployment is certainly moving towards a suicidal end. Loss of jobs due to closure of businesses and factories is on the high side. Our economy is so bad that even various government agencies and parastatals are considering mass retrenchment and down-sizing of its work force as an alternate route to sustain governance but for the resistance of labour unionist and perhaps the adverse effect on the political fortune of the politicians who coincidentally are the managers of our economy, the case would have been a different story. Lately, slashing of salaries and paying in percentages is what most organizations do and this is a cardinal threat to the economy and the Nigerian nation as the increase in rate of unemployment is skyrocketing. The rising unemployment saga especially amongst the youth is alarming and needs speedy solution.

Nigeria population as at now stands at 203,452,505 (about 203.5) million people and its ranked 7th in the world (Central Intelligence Agency (CIA), World Fact Book, 2019). Of this, it is alarming to state that 90.47 million constitutes her labour force nationwide (National Bureau of Statistics (NBS), 2019). Trading Economics (2018) revealed that youth unemployment rate is 36.50% in the third quarter of 2018 from the total labour force. Unemployment as stated by the International Labour Organization, cited by NBS (2019), is the proportion of those in labour forces actively looking for what to do for work to sustain themselves but could not find. Youth unemployment rate in the country rose to 25% from 17.5% in 2014 (Omoh, 2014). Statistics shows a quarterly rise in unemployment between 2015 and 2016. In 2015, between January – July, it rose from 11.7% to 14.9% while between January – December 2016, it increased drastically to 19.0% (Akinboade, 2016). It is obvious that epidemic problems like this are addressed via veritable education and educational policies. Atsumbe (2017) in his well-researched inaugural lecture echoed the fact that TVET delivery system needs to be well planned to train the skilled and entrepreneurial workforce that Africa needs to create wealth and emerge out of the poverty challenges it is in currently. It is a fact that National Policy on Education (2013) tried to refocus more emphasis on Science, Technology and Vocational Technical Education as a medium for rescuing Nigeria from Socio-Economic nightmare. While the necessary steps and distinctively clear road map for Science and Technology is understood with right attitude and emphasis placed on it since then, the same cannot be said of Vocational and Technical Education. Okonkwo & Okoh (2014) opines that it is either the Federal Government have not come to terms with the economic contribution of Vocational Technical Education to economic transformation or it is that they lack the political will to agree that it is a veritable tool to combat unemployment and poverty in our country – Nigeria. Robert (2017) narrated that when unemployment was seriously noticed among the graduates of tertiary institutions in Nigeria then, the government decided to include entrepreneurship education into the curricular of tertiary institutions so that students acquire entrepreneurship knowledge and skills, and become self-reliant after graduation instead of perpetually waiting for government jobs. But has this inclusion solved the rate of unemployment in our country?

Identified unemployed youths are graduates of one discipline or the other. If the unskilled is unemployed, that is even understood but the skilled graduates by virtue of their certification becomes unemployed; a lot of questions needs to be asked. Is it that the jobs are not there? Is their certification devoid of skills? Are the graduates not interested in using their skills? Does the graduates need further trainings to enhance their skills for usage? Shockingly, graduates of TVET are not left out in the army of the unemployed when they are actually supposed to take the major lead in self-employment and even creating employment for others. Nigeria has reached its peak of determining which academic programme is justifiable and most suitable to contribute and impact on employment, self-employment and self-reliance hence TVET was envisioned to be a key to unlock into industrial revolution and wealth creation.

Apprenticeship System: An Overview.

Apprenticeship dated back to when each society specialized in arts and crafts. Such include the popular Oyo carving, the Benin bronze smelting, the Kaduna Nok sculpturing are good examples of the traditional societies (Pelemo, 2007). Fafunwa (2004) stated that the various skills taught as part of educating the Nigerian child include weaving, sculpturing, blacksmithing, carving, farming, fishing, cattle-rearing, hair-plaiting, dress-making, catering, dyeing, tinkering, etc. Each child is apprenticed to a master craftsman who is skilled in a particular vocation and are found to be peculiar to certain families and consequently transferred to their offspring or apprentice to continue such trades even after the death of the master craftsman.

In the western world, apprenticeship system dated back as far as middle age. A master craftsman will engage the services of young peoplewho normally begin at age ten to fifteen and will live with the master's craftsman household. Most apprentices aspires to become a master craftsman themselves after the successful completion of their engagement (Wikipedia, 2019). Most European countries took advantage of starting the apprenticeship system early hence gave way to their rapid industrialization and technological advancement. Most of the European Governments even came up with favorable policies and regulations on the operation of the scheme. In the Nigeria case, it failed to do so hence our stunted socio-economic growth leading to alarming rate of unemployment. Let us take a glance at the approaches of apprenticeship schemes in selected countries of Europe and beyond –

In Germany: Germany practiced a dual system of education making it possible to learn work and equally attend formal education. Factually, it is impossible to secure gainful employment without completing the apprenticeship scheme. In 2004, the government signed a strong pledge with industrial unions that all companies except the smaller once must take on apprentices. All school leavers of 15 years are made to start an apprenticeship in their chosen profession until about 19 years old of age. They will spend 70% of their time in companies and 30% in school.

In Turkey: They practice apprenticeship scheme with a very high level of commitment and in three levels which are – Proper Stage (QRAK), Pre-Master Stage (KAIFA) and Master Stage (USTA). The government trains the QRAK.

In Pakistan: Apprenticeship training by law is regulated by both industries and TVET institutions for theoretical instructions. It is compulsory for organizations with up to fifty workers to take apprentices at its own cost. Recently, the Pakistan governments in its reform has brought apprenticeship into National Vocational Qualification framework certification after assessment are done jointly by Industry, Chamber of Commerce and Industry and Government through Apprenticeship Management Committee.

In Australia: Apprenticeship covers all industrial areas. They combine working hours and formal education which can either be part time or full time school-based. In fact, Group Training Organizations (GTO), equivalent of Industrial Training Fund (ITF) in Nigeria undertake regular visits and supervision of the programme.

In Britain: Apprenticeship system is the heart of the training in industries. Such training includes combination of academics and practice to correct skill shortages in traditionally skilled occupations and higher technician and engineering professions. Recently, government funded apprenticeship that is off-the-job training. They structured the programme into Intermediate, Advanced, Higher and Degree Apprenticeships.

In United States of America: New policy on Apprenticeship allows apprentice to work between 32 – 40 hours per week at a trade under a journeyman and spend additional 8 hours every other week in classroom academic training.

In Czech Republic: The apprenticeship scheme is highly interesting and looks promising. Apprentices spend about 30 – 60% of their time in companies and the rest in formal school system. They may work for two or three days a week in the company and spend two or three days at a vocational school per week.

From the foregoing, it is clear that apprenticeship system has a global phenomenon which served as a bedrock to present day technology and technological transformation globally. It is therefore imperative that government should encourage the TVET system including apprenticeship scheme which would no longer be a thinking thing theoretically but a doing thing practically as this will give Nigeria a place in the globally inclined technology seat especially in this 21st Century.

NDE Statistics on Apprenticeship

In an attempt to promote apprenticeship as a veritable way towards self-employment came into setting up in 1986 the National Directorate of Employment (NDE). To this end according to Okoye 2014, NDE went deeper into TVET with the following training models/strategies: To promote -

(a) Cognitive apprenticeship and skills acquisition training models.

(b) On the job training model for the under-employed graduates.

(c) Off the job training model for distance training course programmes.

NDE in an effort to justify their set objectives threw all its efforts on National Open Apprenticeship Training Scheme, School on Wheels Training Scheme, Rural Handicraft Training Scheme, Rural Agriculture Development Training Scheme, Advanced National Open Apprenticeship Scheme, Professional Pupilage Scheme, and Graduate Attachment Programme. The successful achievements of this NDE seven core mandate is open to guess because the high rate of unemployment is on the increase despite the successful executed and implementation of these NDE programmes. For instance, unemployment steadily rose from 7.9 million in 2007 to 18.2 million in 2013 (National Bureau of Statistics) and the then Minister of Finance and Chairman of the Economic Team in Nigeria – Kemi Adeosun puts employment figure at 37% (NBS, 2017). It is therefore an open secret that NDE programmes are not visible in convulsing the economy of our great country – Nigeria.

Technical Vocational Educaton and Training Curriculum: Philosophy and Objectives.

Eruanga (2000)describes Technical Vocational Education and Training as the education that provides students with knowledge and skills alongside with adequate practical experience in the field of professional technology for national development. It is a field that uses principles of Mathematics, Physics, Chemistry, Technical Drawing, etc. to improve production and job creation. It also draws skills from core subject areas through education programmes, workshops, seminars and conferences. Therefore, aims of TVET can be understood that the skills, knowledge, and attitudes acquired are expected to be transferred to the student's lives and others for the development of the nation.

The National Commission for Colleges of Education (NCCE) minimum standard for NCE – Technical Education (2012) stipulated the Philosophy of Technical Education on improving lives of the youth and society in general. It insist on the acquisition of knowledge, skills and competence which the society members determines the relevant strategies in achieving them. The NCE Technical programmes is divided into five major areas which are Automobile, Building, Electrical/Electronics, Metal and Wood Work Technology. The core objectives of TechnicalEducation includes, to –

1. give training and impart the necessary skills leading to the production of Craftsmen, Technicians and other skilled personnel who will be enterprising and self-reliant.

2. provide trained manpower in the applied science, technology and commerce particularly at sub-professional level.

3. enable young men and women to have intelligent understanding of the increasing complexity of technology.

As individual acquires in-depth knowledge, skills and attitudes relevant to Technical Education, he or she is exposed to various courses of specialization that can help create jobs and become self-reliant. It is therefore noticeable that there are abundant opportunities embedded in the NCE (Technical) field. Therefore, various occupational choices available in Technical Education are as follows –

(a) Teaching:Teaching is an avenue to display and extend educational experiences to equip and develop citizenry. The primary objectives of producing professional trained technology teachers is to impart knowledge at primary and various technical vocational institutes across the country.

(b) Self-Employment: Technology graduates at NCE level may not necessarily engage in sourcing for white collar but can establish technical related businesses and also partner with others. Businesses that can be established in technical fields are numerous.

(c) Consultancy Services: Vast experiences of technical graduatesin the fields of Automobile, Building, Electrical/Electronics, Metalwork and Woodwork Technology allows them become consultant in the field of specialization. Such consultancy services attract reasonable fee that can earn income for a living.

(d) Organizing Workshops/Seminars: NDE are directed to train some selected technicians from each local government on technical servicing and repairs. Such workshops and seminars could be organized by graduates of technology either single handedly or collectively and such can yield income and also educate people and be of benefit to the entire nation at large.

(e) Vocational Training Centres: With the current economy hardship telling on Nigerians now, NCE Technical graduates can take advantage of this by recruiting people and training them on various occupational trades and skills embedded in technical fields. This will in turn create opportunity for many youths after requisite training from vocational centres to be self-reliant and become not only useful to themselves but to the country at large.

Integrating Apprenticeship Scheme into NCE (Technical) Curriculum

Any attempt to make students useful to themselves and the society must start from curriculum reform, this is because the 21st century graduates must occupy 21st century occupation. NCE Technical can be made to have full apprenticeship in industries and workshops for one year to enable them acquire and imbibe the art and culture of practical technology realistically. First year can be for full time academic studies, year two should be for apprenticeship while year three should be for teaching practice, project work and certification.

Courses not related to Technical Education should be removed from the curriculum to give room for purely technical related courses, and practically-oriented apprenticeship schemes which the students will need to grow to become authorities and successful in the field of technology should be encouraged. Too many courses (theoretical) has induced TVET students to study vocational arts like liberal arts subjects basically for passing examinations that may channel them towards University Education (Tibi, 2012). Fundamental practically-oriented technical courses should be taken strictly while the apprenticeship scheme be inculcated within the NCE curriculum programme in line with that of the European countries explained above.

Conclusion

The rising unemployment cases in our country needs to be looked into.Atsumbe (2017) reported that it is clear that there is a spread and severe poverty among Nigerians, the World Bank classified Nigeria as one of the countries in sub-Saharan Africa where 65.6% of the population are described as poor, lacking access to basic amenities and unable to meet basic daily needs. Time is now over-ripped to take a closer look into the NCE Technical programme with a view for a drastic reform hence a suggested shift from cognitive theoretical courses overload to practically-oriented apprenticeship scheme and training that will create room for acquisition of21st century skills.

Recommendations

1. Government should promote awareness for emphasis on practical apprenticeship scheme in NCE Technicalprogrammes as this will help in removing lapses in TVET Curriculum.

2. Relevant agencies should create enabling environment for apprenticeship and accredit various technical institutions and vocational centres as obtainable in Germany, Austria, Switzerland and Pakistan.

3. The Apprenticeship Scheme should be prioritized because it has high tendency for self-employment. When there are various technical related businesses established; our economy will be better off than it is now as people will be gainfully employed.

4. Our NCE Technical curriculum should be urgently reviewed to provide for mandatory apprenticeship scheme clouded with in-depth practical trainings skills in industries relevant to Automobile, Building, Electrical/Electronics, Metalwork and Woodwork fields.

5. Governments, Banks, NGO’s and technology related agencies should periodically provide soft loans for graduates of NCE Technical Education to set up own businesses and workshops after graduation.

6. A crystal clear certificate should be issued by each industry where students successfully undergo apprenticeship trainings and this certificate should be placed with high value such as being a collateral to access loans for the purpose of funding renovations and setting up of technical related workshop facilities.

7. Secondary School Education in Nigeria should be vocationalised such that every secondary school leavers is made to take relevant training in form of apprenticeship in a particular vocation. With this, aspiring NCE (Technical) students will have a foundational base making it easier for them to progress in knowledge and skills without fear or pressure.

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ASSESSMENT OF TECHNICAL EDUCATION TEACHERS' COMPETENCY IN CURRICULUM DEVELOPMENT SKILLS FOR DELIVERY IN THE 21ST CENTURY IN TERTIARY INSTITUTION IN BENUE STATE

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Abstract
This paper hinges on Assessment of' Technical Education Teachers' Competency in Curriculum Development Skills for Delivery in the 21st Century in Tertiary Institution in Benue State. This study identifies Competency area of Curriculum Development Skills for delivery, Competency Training Techniques of Curriculum Development Skills for delivery and Competency Challenges of Curriculum Development Skills for delivery which is the potential for Curriculum Development Skills for delivery in the 21st Century. A survey research design was used in this study, the population of the study comprised 207 Technical Teachers selected from seven (7) out of the nine (9) Tertiary Institution in Benue State, no sample for the study was taken as the population was of a manageable size. Data were collected using a developed questionnaire titled "Assessment of Technical Education Teachers' Competency in Curriculum Development Skills Questionnaire" (ATETCCDSQ)the questionnaire was divided into three sections and each section tested the research questions. The reliability of the instrument was determined using Crombach Alpha with reliability coefficient of 0.87 using test-retest method. In analyzing the data Mean and Standard Deviation statistical tool was used for the research questions. The findings from this study showed that most items are in agreement with Competency area of Curriculum Development Skills for delivery in the 21st Century by Technical Education Teachers in Benue State tertiary institution. One of the recommendations was that technical teacher training institutions in Benue state should work on Competency area of Curriculum Development Skills for delivery to produce an acceptable curriculum that will enhance needed competencies for the upcoming teachers

Keywords: *Competency, Curriculum development, Skills, Technical Education Teachers*

Introduction
Assessment of Education, educational practices and educational practitioner has been regarded as part and parcel of teaching and learning right from the time formal education came to existence. Attainment of educational objectives and goals in education in the absence of assessment cannot be possible. Assessment is the bedrock of any educational success as test

scores usually derived are used to measure learners' academic strengths and weaknesses. Therefore, it brings about changes in general situation of life. Change has always been a constant factor in any human endeavour which cannot take place unless people bring change in the face of the prevailing circumstances and environment.

Okolocha, Ile and Ezenyilimba, (2012) points out that, There must be revolutionary changes in institutions (both formal and non-formal) service delivery patterns, what teachers teach, patterns of teaching, and how students learn with the aims of identifying citizens potentials, equipping them with relevant skills and knowledge and eradicate poverty amongst the populace Asuequo (2011) described Assessment as the systematic collection, review and use of information for estimating worth, quality or effectiveness of a training programme for purposes of improvement of a programme. Agada (2012) described Assessment as a process in which one make a judgment about a person or situation. In this study, the assessment of Technical Education Teachers' Competency has to do with collecting data in order to pass judgment on Curriculum Development Skills for Delivery. In the views of Salawu, Tukur, Olude, Maja, Adeyanju (2006), assessment of a training programme can be a component of evaluation which can help to determine progress made towards achievement of training objectives. Amaechi and Thomas,(2016)points out that Teaching and learning strategies in technical and vocational education programme is to impart the basic scientific knowledge, attitudes and practical skills necessary for self-reliance and national development. This implies that; the technical institutions are expected to train and produce graduates who are equipped with the practical rudiments of their chosen trades. Teaching of students in technical and vocational subjects, need to have high quality teachers to impart high quality knowledge, skills in these situations competencies that will be effective in Vocational and Technical Education.

The National Commission for Colleges of Education (NCCE) is guided in all its activities by its vision to produce "well–motivated teachers with high personal and professional discipline, integrity and competence. It means that the rationale for training students in these trades is to impart or rather for the acquisition of knowledge, attitudes and practical skills that are marketable and lucrative for a general development. This implies, to impart these qualities in any individual effective teaching strategy or techniques must be employed during the teaching and learning process. Technical Education Teachers' must be vocationally and technically competent in Curriculum Development Skills for Delivery in Tertiary Institution. The NCCE(2012) plans for The NCE Teacher Education Programmes incorporate newly formulated 'Teacher Standards.' These Teacher Standards have been developed through several Federal and State processes and represent a clear description of the knowledge, skills and attitudes a professional teacher should exemplify. As the Teacher Standards are an approved part of all NCE Teacher Education, it is necessary for NCE-awarding Institutions to comply with these new Teacher Standards, and the assessment of student teachers should be guided by the Teachers Standards.

Competency reflects the ability to do something in contrast with more traditional ability to demonstrate knowledge. Adameji (2014) describe Competency as the ability to be a competent, adequate possession of required skills and knowledge; qualification, or capacity. Alawa, Abanyam and Okeme (2010) view competency as the successful performance of a task through the use of knowledge, skill, attitude and judgment, and emphasized that competency can also be referred to as the state of being functionally adequate in performance of one's duty. Yaduma and Agada (2018) points out that, competencies are those attributes which enable the application of skills, knowledge and attitude in the performance of technical task in occupations or professions. Competencies in this study are those attributes which enable the application of skills, knowledge and attitude in the performance of technical task in occupations or professions which will result in high level man power that required long term training in tertiary education institutions such as universities and colleges. Therefore, being competent means that individual has acquired knowledge, skills and attitudes which are required for performing successfully at a specified proficiency level in any given work. Technical Education Teachers' in Tertiary Institution in Benue State must be competent vocationally and technically to Curriculum Development Skills for Delivery in the 21stCentury.

Curriculum Development is the process of planning, developing, building and designing what is to be taught, how it is to be taught, who is to teach and why it is taught and how to get likely outcomes after teaching. Yaduma, and Agada (2018) described Curriculum development as the process of planning learning experiences intended to bring about certain changes in learners and the assessment of the extent to which these changes have taken place. Megha and Patankar (2013) explained that Curriculum development is the process of creating planned syllabus, teaching, training, and exhibition modes. It is a term used to refer to the process of instituting and putting in place precise guidelines of instruction for the curriculum. It describes ways in which teaching and different training organizations plan and guide learning which can be in groups or as an individual. Aboho, Gbamanja and Aboho, (2017) points out that it involves goal setting, content selection, and selection of learning experiences, organization of content and learning experiences and other evaluation. Curriculum development requires the participation of administrators, teachers, students, experts and the wider society. Agada, Atama and Ali, (2019) described Curriculum as the comprehensive plan for an educational/training programme/course to training programme/course to offer new/improved manpower to fulfill the rising needs of a dynamic society. Curriculum offers teachers the ideas and strategies for assessing student progress, without the guidance of a curriculum, teachers cannot be certain that they have supplied the necessary knowledge or the opportunity for student success at the next level. Curriculum can help students to achieve some personal control over their learning, to plan their semester, and to manage their time effectively can support them in their teaching or delivery in the 21st Century.

Possession of Skill is demonstrating the habits of acting, thinking and behaving in a specific activity in such a way that the process becomes natural to the individual through repetition or practice. Skill denotes the ability to bring about some end results with maximum certainty through the repetitive performance of an operation which is acquired through training. Technical Education Teachers know the needs of all stakeholders of education in Curriculum development, teaching methods and teaching strategies, assessment of learning outcomes and each step of curriculum development process. Therefore Skill possession in curriculum development for Delivery in the 21st Century hinges on analysis of philosophy, social forces, needs, goals and Objectives, treatment of knowledge, human development, learning process, instruction and decision.

Teachers can understand the psychology of the learner. Teachers are aware of the teaching methods and teaching strategies. Teachers also play the role as evaluator for the assessment of learning outcomes. So teachers must possess some qualities such as planner, designer, manager, evaluator, researcher, decision maker and administrator. Teachers play the respective role for the each step of curriculum development process. Curriculum planning involves analysis of philosophy, social forces, needs, goals and Objectives, treatment of knowledge, human development, learning process, instruction, and decision. Curriculum preparation involves systematic data, content, selection, collection, assessment, organization. Design factors includes school (levels, types, Structures), educational technology, systemic vocational, social reconstruction, Curriculum design, analysis of social needs, translating the needs into Course/general/learning/terminal objectives, splitting the objectives into specific objectives, grouping the specific objectives into subjects, deriving the subjects from the above classification, specifying enabling objectives, unitizing each subject matter, specification of required time, and syllabus formulation. Curriculum development phases consist of Instructional development, materials & media development, methods of teaching and testing implementation of the Curriculum involves instructional scheme of each subject to be completed in the semester, planning the lessons as per the timetable, using the transactional strategies, using the appropriate media, Providing the learning resources, promoting classroom learning experiences, progressive testing curriculum evaluation involves, intra-curricular evaluation, teacher evaluation of students, Student evaluation of teachers, materials evaluation, Verification of methods, Evaluation of tests and examinations, Checking the learning outcomes while on the field, curriculum review/ improvement/ change/ modification, System revision.

Statement of the Research problem

This study hinges on the Assessment of' Technical Education Teachers' Competency in Curriculum Development Skills for Delivery in the 21st Century in Tertiary Institution in Benue State. Technical Education Teachers know the needs of all stakeholders of education in Curriculum development, teaching methods and teaching strategies, assessment of learning outcomes and each step of curriculum development process. The problem of this study is how well and often do Technical Education Teachers demonstrate Competency in Curriculum Development Skills deliveryin Tertiary Institution especially in Benue State. Competency and skill are very important in Curriculum Development; Technical Education Teachers need them for academic delivery for in the 21st Century. Therefore Assessment of' Technical Education Teachers' Competency in Curriculum Development Skills for Delivery is very vital. This formed the thrust of this study.

Aims and Obectives of the study

The aim of the study was to assess Technical Education Teachers' Competency in Curriculum Development Skills for Delivery in the 21st Century in Tertiary Institution in Benue State. The specific objectives seek to determine:-

1. Competency area of Curriculum Development Skills for delivery
2. Competency Training Techniques of Curriculum Development Skills for delivery
3. Competency Challenges of Curriculum Development Skills for delivery

Research questions

1. What is the Competency area of Curriculum Development Skills for delivery?
2. What are Competency Training Techniques of Curriculum Development Skills for Delivery?
3. What are Competency Challenges of Curriculum Development Skills for Delivery?

Research hypotheses

$Ho_{1:}$ There is no significant difference in the mean response scores of Technical Teachers and Instructors on Competency area of Curriculum Development Skills for delivery

Ho_2 There is no significant difference in the mean response scores of Technical Teachers and Instructors on Competency Challenges of Curriculum Development Skills for Delivery

Methodology
A survey research design was used in this study. The researchers considered this design appropriate since no variable was manipulated in this study. The population study comprised two hundred and seven(207) Technical Teachers and Instructors selected from seven (7) out of the nine (9) Tertiary Institution in Benue State, these include Benue State Polytechnic Ugbokolo, College of Education Oju, College of Education Katsina/Ala Akperan Orshi College of Agriculture Yandev, College of Advance and Professional studies, Benue State University Makurdi and University of Agriculture Makurdi. They are located in Benue States: no sample for the study was take as the population was of manageable size. Data were collected using a developed questionnaire titled "Assessment of Technical Education Teachers' Competency in Curriculum Development Skills Questionnaire" (ATETCCDSQ) the instrument (ATETCCDSQ) was divided into three sections A, B and C, The questionnaire is divided into three sections and each section tests the research questions. In section A has ten (10) item questions, twelve (12) item question in section B and ten (10) item Question in section C. The response format of (CRPPFGCQ) was based on a modified four-point scale pattern of Strongly Agree (SA=4), Agree (A=3), Disagree (D-2) and Strongly Disagree (SD-1). Any item whose mean value is 2.50 and above was regarded as Agreed while below 2.50 was regarded as disagreed.

Validation /Reliability
The instrument was content and face validated by three experts from the Department Vocational and Technology Education, Abubakar Tafawa Balewa University, Bauchi State Nigeria before being used for data collection. The reliability of the instrument was determined using Crombach Alpha and reliability coefficient of 0.87 was obtained.

Data Collection and Analysis Technique
A total of two hundred and seven (207) copies were administered to the respondents, 207 were completed and retrieved which represent 100% return. Mean score was used for data analysis and to answer the research questions. The cutoff point of 2.50 was used

Results:
Mean and standard deviation were used for answering the research questions. Based on the modified four-point rating scale, any item with mean score of 2.50 and above was regarded as agree while any item with mean score of less than 2.50 were regarded as disagree.

Research question1: What is the Competency area of Curriculum Development Skills fordelivery on tertiary institution in Benue State? The result on Competency area of Curriculum Development Skills for delivery on tertiary institution in Benue State was as presented in Table 1

Table 1: Mean response scores of respondents on Competency area of Curriculum Development Skills for delivery on tertiary institution in Benue State

N = 207

S/No.	**Questionnaire Item Statement**	$\bar{X}$	**SD**	Remark

What is the Competency area of Curriculum Development Skills for delivery?

1. Competency of on Diagnosis of needs.	3.75	0.43	strongly Agree
2. Competency on Formulation of objectives.	3.13	0.83	strongly Agree
3. Competency on Selection of content	3.49	0.77	strongly Agree
4. Competency on Organization of content	2.79	0.89	Agree
5. Competency on Selection of learning experiences	2.78	0.81	Agree
6. Competency on Organization of learning experiences.	3.13	0.83	strongly Agree
7. Competency on Determination of what to evaluate	3.75	0.43	strongly Agree
8. Competency on ways and means evaluate	3.70	0.46	strongly Agree
9. Competency on practical work or simulation material	2.66	0.90	Agree
10. Competency on basic process skill of critical point	2.81	1.02	Agree

Symbols keys: $\bar{X}$ = Mean score, **SD =** Standard Deviation**, N=** Numbers of respondent

Table 1 shows that, the respondents strongly agreed on six (6) items which are 1, 2, 3, 6, 7, 8 while the respondents also agreed on four (4) items which are 4, 5, 9 and 10 bringing the total numbers to 10 items in section A, with mean values of between 2.66 and 3.78 all these items mean values were high and within the real limit of numbers 2.50-4.00.indicating that the items are in agreement with Competency area of Curriculum Development Skills for delivery on tertiary institution in Benue State .

Research question 2: What are the Competency Training Techniques of Curriculum Development Skills for Delivery in the 21st Century on tertiary institution in Benue State?

The result on Competency Training Techniques of Curriculum Development Skills for Delivery in the 21st Century on tertiary institution in Benue State as was as presented in Table 1

Table 2: Mean response scores of respondents on Competency area of Curriculum Development Skills for delivery on tertiary institution in Benue State

N = 207

S/No Questionnaire Item Statement	$\bar{X}$	**SD**	**Remark**
What are the Competency Training Techniques of Curriculum Development Skills for Delivery in the 21st Century?			
11. Competency Training Techniques on Lecture/presentation	3.80	0.41	strongly Agree
12. Competency Training Techniques on Demonstration	3.90	0.37	strongly Agree
13.CompetencyTraining Techniques on Discussion	3.59	0.59	strongly Agree
14.CompetencyTraining Techniques on Group project	3.77	0.43	strongly Agree
15.CompetencyTraining Techniques on Independent study	3.65	0.55	strongly Agree

16. Competency Training Techniques on Simulation strongly Agree	2.86	0.91	
17. Competency Training Techniques on Media strongly Agree	3.59	0.62	
18.Competency Training Techniques on Print strongly Agree	3.97	0.17	
19.CompetencyTraining Techniques on Graphics Agree	2.75	0.86	
20.Competency Training Techniques on Audio	2.88	0.87	Agree
21.Competency Training Techniques on Video strongly Agree	3.80	0.41	
22.CompetencyTraining Techniques on Computer based/ multimedia	2.98	0.77	Agree

Table 2: shows that, the respondents strongly agree on eight (8) items which are 11, 12, 13, 14, 15,17,18and 21 while the respondents also agree on four (4) items which are 16, 19, 20 and 22bringing the total numbers to 12 items in section B, with mean values of between 2.75 and 3.97 all these items mean values were high and within the real limit of numbers 2.50-4.00.indicating that the items are in agreement with Competency Training Techniques of Curriculum Development Skills for Delivery in the 21st Century

Research question **3**: What are the Competency Challenges of Curriculum Development Skills for delivery in the 21st Century on Tertiary institution in Benue State?

The result on Competency Challenges of Curriculum Development Skills for delivery in the 21st Century on Tertiary institution in Benue State as was as presented in Table 3

Table 3: Mean response scores of respondents on Competency Challenges of Curriculum Development Skills for delivery on tertiary institution in Benue State

S/No Questionnaire Item Statement	$\bar{X}$	SD	Remark
Competency Challenges of Curriculum Development Skills for Delivery			
23. Challenges on curriculum of Technical Teacher Education	2.86	0.83	Agree
24. Challenges on recruitment and training	2.85	0.74	Agree
25. Challenges Non – professionalization of Teaching	2.68	0.97	Agree
26. Challenges Inadequate Funding	2.67	0.70	Agree
27. Challenges on inadequate instructional facilities	2.72	0.61	Agree
28. Challenges Non-involvement in Curriculum Planning	2.67	0.97	Agree
29. Competency Challenges on Decision-making	2.92	0.64	Agree
30. Competency Challenges on Motivation of teachers	2.94	0.71	Agree
31. Information and Communication Technology (ICT).	3.03	0.69	strongly Agree
32. Competency Challenges on Political Problem	3.00	0.68	strongly Agree

Table 3: shows that, the respondents strongly agree on two (2) items which are 31and 32, while the respondents also agree on eight (8) items which are 23, 24, 25,26,27,28,29 and 30 bringing the total numbers to 10 items in section C, with mean values of between 2.67 and 3.03

all these items mean values were high and within the real limit of numbers 2.50-4.00.indicating that the items are in agreement with Competency Challenges of Curriculum Development Skills for Delivery in the 21st Century on Tertiary institution in Benue State

Discussion of Findings

The finding from table I: reveals that the respondents strongly agree on eight (8) items these are Competency of on Diagnosis of needs, Competency on Formulation of objectives Competency on Selection of content, Competency on Organization of learning experiences ,Competency on Determination of what to evaluate and Competency on ways and means to evaluate while the respondents also agree on four (4) items which are Competency on Organization of content, Competency on Selection of learning experiences, Competency on practical work or simulation material and Competency on basic process skill of critical point bringing the total numbers to 10 items, with mean values of between 2.66 and 3.78 all these items mean values were high and within the real limit of numbers 2.50-4.00.indicating that the items are in agreement with Competency area of Curriculum Development Skills for delivery on tertiary institution in Benue State .

The findings from table 2 Indicate that, the respondents strongly agree on eight (8) items which are Competency Training Techniques on Lecture/presentation, Competency Training Techniques on Demonstrati on, Competency Training Techniques on Discussion, Competency Training Techniques on Group project,. Competency Training Techniques on Independent study, Competency Training Techniques on Media, Competency Training Techniques on Print and Competency Training Techniques on Video while the respondents also agree on four (4) items which are Competency Training Techniques on Simulation, Competency Training Techniques on Graphics, .Competency Training Techniques on Audio and Competency Training Techniques on Computer based/ multimedia bringing the total numbers to 12 items in section with mean values of between 2.75 and 3.97 all these items mean values were high and within the real limit of numbers 2.50-4.00.indicating that the items are in agreement with Competency Training Techniques of Curriculum Development Skills for Delivery in the 21st Century

The findings from table 3 indicate that the respondents strongly agree on two (2) items which are Information and Communication Technology (ICT) and Competency Challenges on Political Problem while the respondents also agree on eight (8) items which are. Challenges on curriculum of Technical Teacher Education, Challenges on recruitment and training, Challenges Non – professionalization of Teaching, Challenges Inadequate Funding, Challenges on inadequate instructional facilities, Challenges Non-involvement in Curriculum Planning, Competency Challenges on Decision-making and Competency Challenges on Motivation of teachers bringing the total numbers to 10 items in section C, with mean values of between 2.67 and 3.03 all these items mean values were high and within the real limit of numbers 2.50-4.00.indicating that the items are in agreement with Competency Challenges of Curriculum Development Skills for Delivery in the 21st Century on Tertiary institution in Benue State.

Conclusion

Based on the findings of the study, it can be concluded that Assessment of' Technical Education Teachers' Competency in Curriculum Development Skills for Delivery in the 21st Century in Tertiary Institution in Benue State is very important as most item on table 1 strongly agree and agree that all the items are in agreement with Competency area of Curriculum Development Skills for delivery21st Century in tertiary institution in Benue State.

Also certain items were strongly agree and agree upon in table 2 as items are in agreement with Competency Training Techniques of Curriculum Development Skills for Delivery in the 21st Century in tertiary institution in Benue State while the almost all the item in table where agree upon as Competency Challenges of Curriculum Development Skills for Delivery in the 21st Century on Tertiary institution in Benue State, effect of the curriculum reform plumbing and pipe fitting trade explained

Recommendations

The following recommendations were made based on the result of the study.

1. Technical teacher training institutions in Benue state should work on Competency area of Curriculum Development Skills for delivery to produce an acceptable curriculum that will enhance needed competencies foe the upcoming teachers
2. Nigeria should gear effort towards tapping from technical teacher training institutions in Benue state, her intellects and needed Competency Training Techniques of Curriculum Development Skills for Delivery in the 21st Century
3. This study Assessment of' Technical Education Teachers' Competency in Curriculum Development, for Delivery in the 21st Century in Tertiary Institution in Benue State should be carried out on occupational or specialization area as to ascertained competency of various occupation

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STAKEHOLDERS' PERCEPTION ON BARRIERS TO AND ENABLERS OF INNOVATIONS IN MOTOR VEHICLE MECHANIC WORK CURRICULUM IN NIGERIA

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Abstract

The paper identified stakeholders' perception on barriers to, and enablers of innovations in MVM work curriculum in Nigeria.Two research questions were raised to guide the study and two hypotheses were formulated and tested at 0.05 level of significant. Descriptive survey research design was used for the study. The study was conducted in Federal Capital Territory, Abuja and Kaduna State, Nigeria. The population of the study consisted of 15 stakeholders from Technology and Science Department, Federal Ministry of Education, Abuja, Nigeria and 12 stakeholders from curriculum development department, National Board for Technical Education, Kaduna, Nigeria. The instrument for data collection was a structured questionnaire. The instrument was content validated by three Industrial and Technology Education experts from Federal University of Technology, Minna. Cronbach Alpha was used to determine the reliability of the instrument and yielded .88 and .89 coefficients. The study employed the use of median test to answer the research questions and Mann Whitney U test to test the null hypotheses. Findings revealed among others that, adequacy of facilities, financial resources, time for planning the requirements of the curriculum innovation and curriculum professional support for staff are enablers for innovation in MVM work curriculum in Nigeria. The study recommended among others that, Federal Ministry of Education should create a delicate balance between the identified barriers to and enablers of innovations in MVM work curriculum.

Key words: Motor Vehicle Mechanic Work, Curriculum, Curriculum Innovation, Barriers and Enablers

Introduction

Motor Vehicle Mechanics (MVM) work is one of the trade programmes obtainable in technical colleges in Nigeria. According to the National Board for Technical Education (NBTE, 2001), the goal of MVM work programme is to produce skilled craftsmen with quality knowledge of the working principles of motor vehicles, the techniques and safety practices involve in the maintenance and repairs of vehicles. The achievement of this goal largely depends on the implementation of the contents of MVM work curriculum.

Curriculum is the combination of all instructional practices and learning experiences designed to bring out and evaluate the target learning outcomes of a particular course. Gatawa (2009) defined curriculum as a framework that sets expectations for student learning and serves as a guide for teachers that establishes standards for student performance. Curriculum for MVM work programmecould be seen asa structured series of intended learning outcomes that prescribes the results of instruction in training craftsmen capable of carrying out maintenance and repairs of vehicles. Mathew and Ede (2010) disclosed that, the current curriculum for MVM work programme cannot guarantee the production of craftsmen capable of carrying out maintenance and repairs of modern vehicles due to obsoleteness. Ndawi and Maravanyika (2011) postulated that, in order to remedy this ugly situation, curriculum innovation becomeinevitable.

Curriculum innovation is the application of new objectives, contents, resource or approach that changes social practice of teaching and learning and creates new value in educational system. Chinelo (2018) noted that, Curriculum innovation is a process through which new programmes or practices, techniques and approaches are put in or injected into the existing curriculum.Curriculum innovation according to Ajibola (2008), implies the introduction of ideas or practices that are relatively new such as the recent technological advancements on modern vehicles. Nicholas and Boadu (2013) observes that in every educational system, the need for innovation and innovation must arise from time to time.Effective implementation of curriculum innovation requires to identify and proactively act on both the barriers to and enablers of the curriculum innovations process.

Barriers to curriculum innovation could be seen as the conditions or situations within and outside organizational setup that truncate the actualization of curriculum innovation. Bromme, *et al.* (2005) referred barriers to curriculum innovationsas the challenges which have to be overcome in order to attain the goal successful curriculum innovations process. These challenges includelack of sufficient time, facilities and financial resources required to implement curriculum innovation. Ndou (2018) noted that, poor attitudes and interest of the Government towards curriculum innovation, unrealistic expectations set by the educational administrators andcomfort with the status quo are the common barriers to curriculum innovations. Nevertheless, these barriers could be overcome with enablers of curriculum innovation.

Enablers of curriculum innovation could be seen as the conditions or situations within and outside organizational setup that facilitate the actualization of curriculum innovation.Norman (2015) defined enablers of curriculum innovations as the factors that promote, enhance and ensure curriculum innovations process is achieved. These factors include, Government attitude and interest as well as leadership style. Fink (2016) revealed that, enablers of curriculum innovation process include adequacy of resources, time, institutional philosophy, professional support, professional adequacy and knowledge.These offer conducive atmosphere to stakeholders in curriculum innovation.

Stakeholdersin curriculum innovation are individuals who participates in the welfare and success of curriculum innovation process. Babalola and Ayeni (2009) defined stakeholders in curriculum innovationas group of persons that affects or be affected by curriculum innovation process. In the context of this study, stakeholders in curriculum innovation are key informers and drivers of change in the content, method of delivery, evaluation requirements and scope of MVM work curriculum. These group of persons include students, teachers, school administrators, employers of labour, policy makers in education and curriculum innovators among others. Fadipe and Adepoju (2016) revealed that, policy makers in education (Federal Ministry of Education (FME)) and curriculum innovators(National Board for Technical Education (NBTE)) have a broader interest in the professional attributes of technical college graduates, their work capabilities and career development. Hence, the perception of stakeholders from FME and NBTE can offer insights on the barriers to and enablers of innovations inMVM work curriculum in Nigeria.

Statement of the Problem

The goal of MVM work programme is to produce skilled craftsmen with quality knowledge of the working principles of motor vehicles, the techniques and safety practices involve in the maintenance and repairs of vehicles.It is sad to note that, the goal of the programme is not achieved. Michael (2018) confirmed that, MVM work graduates lack the requisite competencies in the maintenance and repairs of modern vehicles. This could be due to the lack of recent technological advancement contents in the curriculum used for training MVM work students.The situation necessitated urgent implementation of innovation in MVM work curriculum. Hence, this study sought to identifystakeholders' perception on barriers to and enablers of innovations in MVM work curriculum in Nigeria.

Aim and Objectives of the Study

The aim of the study was to identify stakeholders' perception on barriers to and enablers of innovations in MVM work curriculum in Nigeria. Specifically, the study sought to identify stakeholders' perception on:

1. Barriers to innovations inMotor Vehicle Mechanic work curriculum in Nigeria
2. Enablers of innovations inMotor Vehicle Mechanic work curriculum in Nigeria

Research Questions

The following research questions were raised to guide the study:

1. What are the stakeholders' perception on barriers to innovations inMotor Vehicle Mechanic work curriculum in Nigeria?
2. What are the stakeholders' perception on enablers of innovations inMotor Vehicle Mechanic work curriculum innovations in Nigeria?

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance**:**

Ho_1: There is no significant difference between the median responses of stakeholders from Federal Ministry of Education and National Board for Technical Education on barriers to innovations inMotor Vehicle Mechanic work curriculum in Nigeria.

Ho_2: There is no significant difference between the median responses of stakeholders from Federal Ministry of Education and National Board for Technical Education on enablers for innovations inMotor Vehicle Mechanic work curriculum innovations in Nigeria.

Methodology

Descriptive survey research design was adopted for this study. Mulki*et al.* (2016) defined descriptive survey research as design aimed at casting light on current issues or problem through a process of data collection. The study was carried out in Federal Capital Territory, Abuja and Kaduna State, Nigeria. The population of the study consisted of 15 stakeholders (administrators) from technology and science department, Federal Ministry of Education, Abuja, Nigeria and 12 stakeholders (administrators) from curriculum development department, National Board for Technical Education, Kaduna, Nigeria. Totalpopulation sampling technique was used to select all the respondents. The instrument for data collection was a structured questionnaire developed by the researcher and designed on five-points Likert'sscale of Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (DA) and Strongly Disagree (SD)with numerical values of 5, 4, 3, 2, and 1, respectively was used to collect data for the study. The instrument contained two sections, A, and B. Section A comprises of stakeholders' perception on barriers to Motor Vehicle Mechanic work curriculum innovations and section B comprises of stakeholders' perception on enablers of Motor Vehicle Mechanic work curriculum innovations. The instrument was content validated by three Industrial and Technology Education experts from Federal University of Technology, Minna. Cronbach Alpha method was used to determine the reliability of the instrument and yielded .88 and .89 coefficients. Data were collected for the study through hand delivery by two research assistants from the duo organizations involve in the study. The study employed the use of median test to answer the research questions and Mann Whitney U test to test the null hypotheses. Decision on research questions was based on real limit of numbers and decision on the hypotheses was based on comparing U-value withP-value. The choice of median and Mann Whitney U testsfor data analysiswas due to the simplest fact that, they are the most suitable statistical techniques to analyze ordinal data (data collected using Likert's scale).All analysis were carried out using Statistical Package for Social Sciences version 22.

Results

Research Question One

What are the stakeholders' perception on barriers to innovations inMotor Vehicle Mechanic work curriculum in Nigeria?

Table 1: Median Responses of Stakeholders on Barriers to Innovations inMotor Vehicle Mechanic Work Curriculum in Nigeria

N1=15, N2=12

S/N	Items	$\tilde{x}_1$	$\tilde{x}_2$	Decision1	Decision2
1	Lack of sufficient time for planning the requirements of the curriculum innovation	4.00	3.50	Agreed	Agreed
2	Lack of facilities required to implement curriculum innovation	1.50	1.50	Disagreed	Disagreed
3	Lack of financial resources required to implement curriculum innovation	4.00	4.00	Agreed	Agreed
4	Poor attitudes and interest of the Government towards curriculum innovation	4.00	3.50	Agreed	Agreed
5	Inadequate curriculum professional support for staff	4.00	4.00	Agreed	Agreed
6	Staff's inability and competency to implement curriculum innovation with confidence	2.00	3.50	Disagreed	Agreed
7	Comfort with the status quo of the current curriculum	1.50	1.50	Disagreed	Disagreed
8	High workloads faced by curriculum innovators	4.00	4.00	Agreed	Agreed
9	Students' inabilities to comprehend new technological contents	1.50	1.50	Disagreed	Disagreed

Key: $\tilde{x}$ 1=Median score of stakeholders from Federal Ministry of Education, $\tilde{x}$ 2= Median score of stakeholders from National Board for Technical Education, N1= Numbers of stakeholders from Federal Ministry of Education, N2= Numbers of stakeholders from National Board for Technical Education.

Table 1 revealed from the responses of stakeholders from Federal Ministry of Education,five items had median score between 3.50-4.00 and four had median score between 1.50-2.00. The table also revealed from the responses of stakeholders from National Board for Technical Education, six items had median score between 3.50-4.00 and three items had median score of 1.50. This simply implies that, stakeholders from Federal Ministry of Education agreed with five items and disagreed with four and also, stakeholders from National Board for Technical Education agreed with six items and disagreed with three on the barriers toinnovations in Motor Vehicle Mechanic work curriculum in Nigeria.

Research Question Two

What are the stakeholders' perception on enablers of innovations inMotor Vehicle Mechanic work curriculum in Nigeria?

Table 2: Median Responses of Stakeholders on Enablers ofInnovations inMotor Vehicle Mechanic Work Curriculum in Nigeria

N1=15, N2=12

S/N	Items	$\tilde{x}_1$	$\tilde{x}_2$	Decision1	Decision2
10	Adequacy of facilities required to implement curriculum innovation	4.00	4.00	Agreed	Agreed
11	Adequacy of financial resources required to implement curriculum innovation	4.50	4.00	Strongly Agreed	Agreed
12	Adequate time for planning the requirements of the curriculum innovation	4.00	4.00	Agreed	Agreed
13	Institutional philosophy towards curriculum innovation	4.00	3.50	Agreed	Agreed
14	Adequate curriculum professional support for staff	4.00	4.00	Agreed	Agreed
15	Staff's ability and competency to implement curriculum innovation with confidence	3.50	4.00	Agreed	Agreed
16	Teachers' knowledge and understandings regarding curriculum innovation	2.00	1.50	Disagreed	Disagreed
17	Attitudes and interest of the Government towards curriculum innovation	4.00	4.00	Agreed	Agreed
18	Leadership style that facilitates a collaborative approach to curriculum innovation	4.00	4.00	Agreed	Agreed

Table 2 revealed from the responses of stakeholders from Federal Ministry of Education, one item had median score of 4.50, seven items had median score between 3.50-4.00 and one had median score of 2.00. The table also revealed from the responses of stakeholders from National Board for Technical Education, eight items had median score between 3.50-4.00 and one item had median score of 1.50. This simply implies that, stakeholders from Federal Ministry of Education strongly agreed with one item, agreed with seven and disagreed with one and also, stakeholders from National Board for Technical Education agreed with eight items and disagreed with one on the enablers ofinnovations inMotor Vehicle Mechanic work curriculum in Nigeria.

Hypothesis One

Ho_1: There is no significant difference between the median responses of stakeholders from Federal Ministry of Education and National Board for Technical Education on barriers to innovations inMotor Vehicle Mechanic work curriculum in Nigeria.

Table 3: Mann Whitney U Test of Significant Difference Between the Median Responses of Stakeholders on Barriers to Innovations in Motor Vehicle Mechanic Work Curriculum in Nigeria

Respondents	N	U-value	P-value	Remark
Stakeholders from Federal Ministry of Education	15	3.65	0.96	Not Significant
Stakeholders from National Board for Technical Education	12			

Table 3 revealed p-value > 0.5. This implies that, there is no significant difference between the median responses of stakeholders from Federal Ministry of Education and National Board for Technical Education on barriers to innovations in Motor Vehicle Mechanic work curriculum in Nigeria. Hence, hypothesis one was retained.

Hypothesis Two

Ho_2: There is no significant difference between the median responses of stakeholders from Federal Ministry of Education and National Board for Technical Education on enablers for innovations inMotor Vehicle Mechanic work curriculum in Nigeria.

Table 4: Mann Whitney U Test of Significant Difference Between the Median Responses of Stakeholders on Enablers for Innovations in Motor Vehicle Mechanic Work Curriculum in Nigeria

Respondents	N	U-value	P-value	Remark
Stakeholders from Federal Ministry of Education	15	4.10	0.84	Not Significant
Stakeholders from National Board for Technical Education	12			

Table 4 revealed p-value > 0.5. This implies that, there is no significant difference between the median responses of stakeholders from Federal Ministry of Education and National Board for Technical Education on enablers for innovations in Motor Vehicle Mechanic work curriculum in Nigeria. Hence, hypothesis two was retained.

Findings

1. Lack of sufficient time and financial resources required to implement curriculum innovation, poor attitudes and interest of the Government towards curriculum innovation, inadequate curriculum professional support for staffand high workloads faced by curriculum innovators were found to be barriers to innovations inMotor Vehicle Mechanic work curriculum in Nigeria.
2. Adequacy of facilities,financial resources, time for planning the requirements of the curriculum innovation and curriculum professional support for staff, institutional philosophy towards curriculum innovation, staff's ability and competency, attitudes and interest of the Government and leadership style were found to be enablers for innovations inMotor Vehicle Mechanic work curriculum in Nigeria.

3. There is no significant difference between the median responses of stakeholders from Federal Ministry of Education and National Board for Technical Education on barriers to innovations inMotor Vehicle Mechanic work curriculum in Nigeria.

4. There is no significant difference between the median responses of stakeholders from Federal Ministry of Education and National Board for Technical Education on enablers for innovations inMotor Vehicle Mechanic work curriculum in Nigeria.

Discussion of Findings

Lack of sufficient time and financial resources required to implement curriculum innovation, poor attitudes and interest of the Government towards curriculum innovation, inadequate curriculum professional support for staff and high workloads faced by curriculum innovators were found to be barriers to innovations inMotor Vehicle Mechanic work curriculum in Nigeria. These findings concords with the postulations of Ndou (2018) that revealed, poor attitudes and interest of the Government towards curriculum innovation, unrealistic expectations set by the educational administrators and comfort with the status quo are the common barriers to curriculum innovations.
Nevertheless, test for difference between the median responses of stakeholders from Federal Ministry of Education and National Board for Technical Education on barriers to innovations inMotor Vehicle Mechanic work curriculum in Nigeria revealed not significant. This finding is similar to the findings of Mafora, and Phorabatho (2013) that revealed no statistical significant difference between the responses of secondary school principals and manager on curriculum change implementation process. This implies that, both stakeholders share similar perception regarding barriers to innovations in Motor Vehicle Mechanic work curriculum in Nigeria.

Adequacy of facilities, financial resources, time for planning the requirements of the curriculum innovation and curriculum professional support for staff, institutional philosophy towards curriculum innovation, staff's ability and competency, attitudes and interest of the Government and leadership style were found to be enablers for innovations inMotor Vehicle Mechanic work curriculum in Nigeria. These findings are in agreement with the findings of Fink (2016) that revealed, adequacy of resources, time, institutional philosophy, professional support, professional adequacy and knowledge are enablers of curriculum innovation process.

Nevertheless, test for difference between the median responses of stakeholders from Federal Ministry of Education and National Board for Technical Educationon enablers for innovations inMotor Vehicle Mechanic work curriculum in Nigeria revealed not significant. This finding corresponds with the findings of Rosser *et al.* (2003) that revealed no significant difference between the responses of academic deans and directors on their perception on curriculum innovations. This implies that, both stakeholders share similar perception regarding enablers of innovations in Motor Vehicle Mechanic work curriculum in Nigeria.

Conclusion

The aim of the study was to identify stakeholders' perception on barriers to and enablers of innovations in MVM work curriculum in Nigeria. Based on the findings of the study, it is concluded that, perception of stakeholders on barriers to and enablers of innovations in Motor Vehicle Mechanic work curriculum were identified. The findings were limited to the perception of stakeholders from Federal Ministry of Education and National Board for Technical Education. Nevertheless, the presence of enablers of innovation in MVM work curriculum identified increases the likelihood of implementing curriculum innovations.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Federal Ministry of Education should create a delicate balance between the identified barriers to and enablers of innovations in MVM work curriculum.
2. National Board for Technical Education should not hesitate to implement innovations in MVM work curriculum as soon as balance between the identified barriers and enablers is created.

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CURRICULUM INNOVATION IN TECHNOLOGY EDUCATION: THE WAY FORWARD

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Abstract
The paper examine the curriculum innovation and the way forward in Nigeria. The development of the nation lies on its vibrant technology curriculum particularly for the developing nation like Nigeria. The curriculum of technical education in Nigeria need update because of technology innovation in the world. Although the current curriculum for technology education has a lot of issue in the implementation process. Technology education is a multifaceted, multi-disciplinary field of study which is aim at equipping the learner with technical requisite skill. The paper therefore focused on the importance of curriculum innovation in technology education as well as possible suggestion for moving the technology innovation curriculum for technology education.

Keywords: *Curriculum, Innovation, Technology, Education.*

Introduction
Nigeria has a long way to go in terms of curriculum innovation in technology education in order to be relevant in the labour market in 21st century. In Nigeria, the technical institution is still heavily burdened with a lot of setbacks ranging from policy formulation, curriculum implementation to curriculum innovation. The issue is not formulating policies but empowering the implementers to successfully execute the policies. There is need for values reorientation so as to inculcate in the learners the right attitudes, values and the acceptable norms in Nigeria (Afuah, A. 1998). All the stakeholders in the educational sector especially technical education must come together to set the right priorities in education so as to join in the ongoing technological race. It is only when this is done that Nigeria will achieve her lofty goals of buoyant economy and self- reliance.

The importance of curriculum innovation to overall future corporate success cannot be over emphasised in this modern world. We believe that innovation is the engine that will keep business organizations vital and growing. They create and rapidly convert technology skills into products and services, constantly searching for new ways to make technology more useful to customers. Curriculum innovation is the principal driver of societal and global growth. To UNESCO (2011), curriculum consists of a statement of aims and objectives, of content in terms of theoretical knowledge, practical skills to be acquired, attitude towards work and necessary support materials to be used in its presentation. A curriculum usually defines; objectives, outcomes and contents of education and training processes and activities necessary for their achievement and implementation (organizational forms strategies models and methods of teaching and learning) and ways of assessment and criteria for the assessment of achievement (Republic of Serbia, 2008). According to Offorma (2014), curriculum can be define as the document plan or blueprint for instructional guide, which is used for teaching and learning to bring about positive and desirable leaner behavior change. According to Lin (2006), the word innovation is originated from Latin word, innovare which means "to make something new". Back in 1985, Drucker (1985) had define innovation as the entrepreneur specific tool to exploit change for diverse business or service. He added, this innovation can be presented as a discipline which can be learned and practiced. In other words, innovation is also said as "an idea, practice or object that is perceived as new by an individual or other unit of adoption" (Daugherty et al., 2011; Grawe, 2009; Rogers, 1995).

Afuah (1998) suggested that curriculum innovation is the "use of new technical and administrative knowledge to offer a skills to new product or services to customers". Thus many authors concluded that curriculum innovation is "any practices that are new to organizations including equipment, products, services, processes, policies and projects".

Similarly, according to Frascati Manual (OCDE, 2002), technological innovations comprise new or significantly modified technological products and processes, where technological novelty emerges, unlike improvements from their performance characteristics. Pavin (1987) notes "most technologies are complex and are cumulative. They are specific for companies at whose level technologic activity predominantly occurs", while inventors may result from different economic and social environments, innovation are mainly a result of the firm's activity. To be capable to utilize an invention and turn it into innovation, the firm should efficiently combine information, human, financial and materials resources and existence of a functional distribution system is needed. From such perspective, the inventors role differs from that of inventors/person or organisation unit responsible for required factors combination; Some common features of technology innovation process are:

- They imply exploring opportunities for achieving new improved goods (products and services) based upon technical knowledge as well as the market demand change or a combination of the two. Investment efforts of technological innovation predominantly correspond to "development and production engineering, in which knowledge is accumulated by experience in production, learning by using and learning by doing (Pavitt, 1987).
- It is impossible an accurate provision of cost and performances involved in the innovation process mainly based on research and development and users' reaction to the new artifacts. Innovation is based on the use of previously acquired knowledge, on the results of new technologies, on the technological development or on the new combinations of existing technology.

Issues of Implementing Technology Education Curriculum Innovation at Different Technical Education Levels

Technology education curriculum implementation concept is the execution of curriculum document. It is the interpretation of curriculum by the teacher and learners. It is the practice and instruction phases of the curriculum process. According to Saylor, Alexander and Lee, (1982). "It is the actual engagement of learners with learning opportunities. Curriculum implementation is the transmission of the planned curriculum into operational curriculum (Offorma, 2005). The major implementers of the curriculum technology education are the teachers. They set up learning opportunities aimed at enabling learners acquire the desired knowledge, skills, attitude, and values. Technology education curriculum implementation is fraught with a lot of issues which include: Curriculum overload, Large class population, Dearth of instructional resources, Teachers factors, Examination malpractice and Evaluation Ivowi, U.M (2005).

Environmental Issues and Innovation Technology Education Curriculum

Environment is very crucial to the teaching-learning-processes. For effective curriculum implementation the environment must be adequately organized and arranged. This is categorized into physical, social, and psychological components. The human and material resources as well as interaction and attitudinal behaviours in the classroom make up the classroom environment Ivowi, U.M (2005).

The physical environment is made up of the material resources, infrastructures, equipments, structures at home, school and community. The social environment is made up of the social life, societies and clubs. It is also the interaction setting, patterns, modes and media within school eg. The classroom setting, teacher-pupil, pupil-pupil patterns. The psychological environment deals with the condusiveness of the classroom environment. The teacher-learner, learner-learner, learner-method and leaner-material interactions also constitute the psychological classroom environment. The classroom environment may defer from one class to another. It has been found that enriched classroom environment influence learning and thus curriculum implementation Ezeudu (1999), Ofomata and Phil-Eze (2001), Mgbodile (2005) recommend a good classroom/school climate for effective curriculum implementation.

Information and Communication Technology (ICT) and Innovation Technology Education Curriculum

The introduction of information and communication technology into the school system "is one of the innovations and changes in the National policy on Education" (FGN 2004). The world has become a global village and Nigerians have to be trained in the new devices and technologies to be able to follow the trends. The computer, internet, e-mail, video conferencing, the web and electronic white board are valuable to both learners and teachers, information and communication Technology provides skills for individualistic and group work. It also promotes interest and motivation in the learners and facilitates the teachers tasks. ICT introduces variety to the resources and learning styles thus making learning fun.

Issues of Innovation, Reforms and Changes and Technology Education Curriculum

The essence of technology education is to transfer the skill to the society through the learners. Curriculum is a vehicle through which this is achieved. The society is dynamic and changes occur now and then, it is through the curriculum that the positive and acceptable changes in the society are implemented. As new change occur, innovations and reforms are introduced. In Nigeria some educational innovations have occurred and call for reforms in the content resources and evaluation procedures.

Alebiosu (2005) wrote that the reason for innovation in the curriculum is to update the curriculum to enable it meet the demands of the changing society as well as society needs and aspirations. Therefore curriculum reform or review is embarked on whenever there is the need. But as a rule of the thumb, national curricula are advised to be implemented for about ten years before they are reviewed. This is to allow for an opportunity to interact with a wide range of ability students and with the various components of the curriculum change and innovation agents.

The importance of technology and innovation must be emphasized by people at the very top and reinforced by people throughout the corporation. The innovation issues include.

1) Technological Development: Most new developments that threaten existing business practices and technologies do not come from existing competitors or even from within traditional industries (Towner, 2004). A new technology that can substitute for an existing technology at a lower cost and provide higher quality can change the very basis for competition in an industry. Consider, for example, the impact of internet technology on the personal computer software industry.

2) Impact of Stakeholders on Innovation: A company should look to its stakeholders, especially its customers, suppliers, and distributors, for sources of products and service improvements. These groups of people have the most to gain from innovative new products or services. Under certain circumstances, they may propose new directions for product development. Some of the methods of gathering information from key stakeholders are using lead users market research and new product experimentation.

3) Resources Allocation Issues: The company must make available the resources necessary for effective research and development. Research indicates that a company's R &D intensity (its spending on R & D) as a percentage of sales revenue is a principal means of gaining market share in global competition (Franko, 2005). The amount of money spent on R & D often varies by industry.

4) Time to Market Issues: In addition to money another important consideration in the effective management of research and development is time to market. A decade ago, the time from inception to profitability of a specific R&D programme was generally accepted to be 7 to 11 years. According to Karlheinz Kaske, CEO of Siemens AG, however the time of available to complete the cycle is getting shorter. In the past, Kaske says, 10 to 15 years went by before old products were replaced by new ones now, it take only 4 to 5 years" (Hill and Yamada, 2012). Time to market is an important issue because 60% of patented innovations are generally imitated within 4 years at 65% of the cost of innovation.

5) Strategy formulation: research and development strategy deals not only with decision to be leader or a follower in terms of technology and market entry but also with the source of the technology. Should a company develop its own technology or purchase it from others;?
The strategy also takes into account a company's particular mix of basic versus applied and product versus process R&D. The particular mix should suit the level of industry development and the firms particular corporate and business strategies.
The global issue features illustrates how a company's competence in different aspects of R&D can affect its competitive strategy and its ability to successfully enter new market.

6) Products versus process R&D: The proportion of product and process R&D tends to vary as a product moves along its life cycle. In the early stages, products innovations are most important because the product's physical attributes and capabilities most affect financial performance. Later, process innovations such as improved manufacturing facilities,

increasing product quality and faster distribution become important to maintaining the product's economic returns. Generally, product R&D has been a key to achieving differentiation strategies, whereas process R&D has been at the core of successful cost leadership strategies.

Need for Technology Education Curriculum Innovation

Technology innovation is developing new ideas, products, services and processes which exploit technology driven by new technology or by needs, it creates valuable product and build a mobile application that will address a community and global problem for global changes.
The importance of technology innovation curriculum includes Automation, Integration, empowerment, analysis and accountability.

Technology automation presents the opportunity for new innovative skills for implementors to automate routine learning practices, integration technology creates a more effective flow of information among and between various learners, instructors and tools that facilitate integration, the technological empowerment directly empower learners to manage benefits and services according to their schedules and the privacy of their homes, while technological analysis helps learners understand their ability, allow them track and evaluate their performances, uncover long term trends and develop improvement and technological accountability allows for better communication of important information to instructors, learners and decision making.

According to National Education Technology Plan (NETP) 2017 update sets a national vision and plan for learning enabled by technology through building on the work of leading education researchers, schools, higher education leaders and teachers developers with principles provided in the document to support the effective use of technology to improve and enhance learning both in formal and informal settings with transformational learning in action.

Conclusion

It was concluded that technology innovative curriculum will update the skills of the learners toward making him be employed or be self-reliance. It was also concluded that technology innovative curriculum will update the improvement in human welfare increase of public health and agriculture, while value to both short and long-term economic, societal and environmental sustainability.

Technology innovative curriculum will empower learners to acquire technological knowledge and skills to be self-employed, provide trained manpower in technology and industrial, give training and impact leading to technological production.

Recommendations

1. The federal government should periodically make it compulsory to NBTE to update curriculum to include the new innovative skills in the existing curriculum.
2. Experts and professional should be involve in curriculum update in order to achieve proper implementation of new innovative skills in the existing curriculum.
3. Federal and state government should made adequately available resources full implementation of technology innovative curriculum, create awareness and training of implementer of the new innovative skills.
4. Federal and state government should encourage multinational firms to specifically develop and implementation technology through shifting their R & D to the country-setting in motion the internationalization.

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DEVELOPMENT AND EVALUATION OF VIRTUAL LEARNING ENVIRONMENT FOR LEARNING SELECTED TECHNICAL DRAWING CONCEPT IN ILORIN METROPOLIS

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Abstract
This research aimed to develop and evaluate a virtual learning environment for junior secondary school basic technology students in Nigeria. In this study, a mixed method quantitative pilot study design with qualitative components was used to test and ascertain the ease of development and validation of the virtual learning environments. ADDIE model was adopted for developing the virtual learning environments. Convenience sampling technique was used in selecting the three content, Technical drawing and educational technology experts to validate the virtual learning environment. Three validating instruments were employed in conducting this study: (i) Content Validation Assessment Report (CVAR); (ii) Technical Expert Validation Assessment Report (TEAR); (iii) Educational Technology Experts Validation Assessment Report (ETEVAR). All the instruments were face and content validated. CVAR, TEAR, ETEVAR were administered on content specialists, Technical drawing experts, and educational technology experts. The findings revealed that the process of developing virtual learning environment through ADDIE model was successful. In addition, the report from the validating team revealed that the virtual learning environment is valuable for learning Technical drawing It is therefore recommended that virtual learning environment should be produced to teach Technical drawing concepts on large scale.
Keywords: Development, Validation, virtual learning environment and Technical Drawing .

Introduction

Advancement in technology are facing educational institutions to reexamine their learning strategies and objectives to determine how digital technology is used to maximum advantage that is to improve learning outcomes, accommodate diversity in learning needs, tap into social networks and research learning environments for future improvements. The teachers construct lessons that are relevant, progress through many disciplines, encourage learning transfer, and develop thinking skills, treating teamwork as a learning outcome, and exploiting technology for learning support and faster creativity (Saavedra &Opfer, 2012).Drent and Meelissen (2012), argue that the deployment of learning technologies has been of benefits to students and helps the students to develop skills to access information, collaboration, communication, and problem solving. Technology has been of help to the teaching and learning environment. It has make learning for students and teaching for teachers much easier. The connection between technology and learning can be seen as multifaceted phenomena, but research indicates that particular uses of technology can improve students' learning (Moeller &Reitzes, 2011).

Information and Communication technology is one of the first technology development that is ad1opted in education. In Nigeria curriculum, starting from primary school to secondary school, information and communication has always been a core course. Vastimir and Dalibar (2019) stated that integrating information and communication technology into education has improve knowledge in the field of interpretation, learning process and for future professional activity.

Information and Communication technology is an indispensable part of the contemporary world. In fact, culture and society have to be adjusted to meet the challenges of the knowledge age. Therefore, the school will be indispensable in developing an information and communication technology of any country. In addition information and communication technology has the potential to prepare student for a lifetime, because information and communication technology can help students to develop their skills, boost their motivation and widen knowledge and information (Grabe &Grabe, 2017, Hussain, 2017).

Information and communication technologies Oxford University press (2015) defined Virtual Learning Environment (VLE) as a system for delivering learning materials to students via the web. These systems include assessments and students tracking features as well as collaboration and communication tools. They can be accessed both on and off campus, meaning that the system can support students' learning even outside the lecture hall, 24hr a day, and 7 days a week. Kurilovas and Diagene (2010) asserted that Virtual Learning Environment is a single piece of software, accessed via standard web browser, which provides an integrated online learning environment. Virtual Learning Environment provide a means to manage the learning experience, communicate the intended learning experience and facilitate tutors and learners involvement in the experience (Sneha & Nagaraja, 2013).

Virtual Learning Environments are virtual spaces that teacher and students use to share resources, perform activities and interact with one another. These platforms can be used to teach a complete online course or as a supporting feature for face-to- face courses. Virtual learning environment is said to have improve on the weakness of traditional learning methods (Kanaani & Elahi 2012). Virtual learning environment is more realistic and practical when compared to the traditional method of learning. The main goal of Virtual Learning Environment is to ease, motivate and provide learning experiences that go beyond the classroom. Barker and Gossman (2015) stated that Virtual Learning Environment boasts a wide spectrum of research showing positive impacts across different contexts. Virtual Learning Environments has been successfully employed in educational applications and it is at the core of what is known as virtual reality learning environment (Monahan & Bertolotto 2018).

Virtual Learning Environment has brought about changes in education all over the world. Curriculums have been adjusted to include electronic learning i.e virtual learning environment. This all means that the kind of education, which was good enough twenty years ago, is not good today (Frumina &West 2012).In a Virtual Learning Environment (VLE), some education providers may use open source Learning Management System like module, a tutor, Eliademy, canvas or Chamilo while others may opt into commercial ones or establish their own. The function perform by Learning Management System (LMS) in a virtual learning environment are execution and lessons delivery. Antonacci (2016) asserted that engagement in Virtual Learning Environment enable student to experience learning opportunities that would not normally be easily accessible, including role playing, operating stimulated equipment, designing and building things or creating simulation of physical or procedural processes. Through these activities they claim students engage in higher levels of cognitive functioning such as interpreting, analyzing, discovering, evaluating, acting and problem solving. Virtual Learning Environment have recently emerged as an important topic in education theory and practice (Weller, 2007). A well-maintained virtual learning environment should enable student of all learning styles to receive the best possible education in a way that they may not in an exclusively lecture based environment. The Virtual Learning Environment available to students for this project were Edmodo, Schoology, Uscovirtual and WizIQ. The first two have gained reputation worldwide as open access online learning environment, whereas the latter is a closed access virtual learning environment used at the public institution targeted in the study. These four platforms have proved to be a secure learning environment over the researchers teaching experiences. Most teachers from the teacher education program and those surveyed for this study have used these platforms at different time over the years and state that their experience in terms of pedagogical benefit, technological advantages and practically has been positive. No teacher has ever reported any harm caused by the use of the aforementioned virtual learning environments.

The ADDIE model (analysis Design, Development, Implementation and Evaluation) will be used for the development and evaluation of Virtual Learning Environment. The model which is a recognized and proven instructional design methodology (Deif, 2015). The guide to e-learning methodologies by the Food and Agriculture Organization of the United Nations (Ghirardini, 2011) also recommends the ADDIE model as a suitable methodology to develop e-learning materials (virtual learning environments).

Virtual Learning Environment has been used to deliver various pedagogy act online and been a source of knowledge to teachers and students. Virtual Learning Environment can be used to teach courses such as technical drawing, biology, chemistry etc. Specifically, on these projects the development of the Virtual Learning Environment will be used to teach technical drawing in secondary schools. Different applications have been use online to develop virtual learning environments such as Edmondo, Schoology, Uscovirtual etc.

Technical drawing is a type of detailed drawing usually employed in courses such as architecture, engineering and constructions. Technical drawing is the act and discipline of composing drawings that visually communicate how things functions or is constructed. Technical drawing is essential for communicating ideas in industry and engineering. Using a Virtual Learning Environment to teach technical drawing makes it easier and more convenient for secondary school student. It is more captivating and motivating which enhance and facilitate quick and fast learning for secondary students.

Virtual Learning Environment will increase the efficiency and effectiveness of teaching and learning Technical Drawing in schools. Like real classrooms, virtual classrooms may also influence student's interest and anticipated success by virtue of their design potentially facilitate the attainment of relevant life skills that support the economic and information development process, if it is carefully integrated into education (Azra & Leonard, 2010). Secondary schools must think globally in order to respond to student's needs, create new relationships, design new programs and rebuild their conceptions on the characteristics on learning environments to encourage innovation, experimentation and teachers activities. To satisfy these requirements, secondary schools must promote the use of information and communication technology. Electronic learning has been a form of integrated information and communication technology in education. Ahmed (2010) stated that electronic learning is changing the way teaching and learning process is taking place in institutions. Electronic learning has change the way people in Nigeria perceive education, because it has enhance the quality of teaching and learning. A broader definition of electronic learning is provided by Selim (2017) as the delivery of course content via electronic media, such as internet, intranet, extranet, satellite broadcast, audio-video tape, interactive TV and CD-ROM. Electronic learning is divided into different type such as web- supplemented courses, virtual reality, and virtual learning environment.

Electronic learning has been practiced in schools and cooperate occupational training contexts as part of lifelong learning. However, with emergence of new open and mobile platforms and web applications, a range of possibilities has opened to facilitate teaching and learning process in a blended environment. As a result, electronic learning has been implemented in all educational system. Docebo (2016) asserted that electronic learning is a growing field. Pumahapinyo and Svwannatthachote (2014), stated that various forms of technology are used to facilitate e-learning, with most applications using a combination of techniques such as blogs, collaborative software, e-portfolios, and virtual classrooms. Particularly for secondary schools, an increasing tendency is to create a virtual learning environment in which all aspects of a course are handled using a consistent and standard interface throughout the institutions (e.g Moodle, Schoology, Edmodo).

Statement of the Problem

The integration of Virtual Learning Environment into teaching and learning process has not made much progress in African countries. Most of African countries which are developing countries are faced with varied challenges that include poverty, poor infrastructure, poor infusion and use of Information Technology (IT), poor education facilities and lack of experienced and skilled personnel. Bridging these gaps institutions in country such as South Africa have been involving advance technology into their educational system such as virtual learning environment. The use of Virtual Learning Environment has promoted innovations and encourage educators and learners to grow from traditional to virtual learning pedagogy that supports cognitively informed Virtual Learning Environments. Hence, this study develops and evaluates Virtual Learning Environment for learning selected Technical Drawing concepts in Ilorin metropolis.

Purpose of the Study

The main purpose of this study is to develop and evaluate virtual learning environment for learning selected technical drawing concepts in Ilorin metropolis. Specifically, this study:

1. developed virtual learning environment on technical drawing concept.
2. determined (Educational Technology and Technical drawing) expert rating of the developed Virtual Learning Environment on Technical Drawing concept.
3. determined the cost of developing Virtual Learning Environment.

Research Questions

Answers were sought out to the following research questions:

1. What are the processes involved in the development of Virtual Learning Environment on technical drawing concepts?
2. How do (Technology Education and Technical drawing) experts rate the developed virtual learning environment for teaching a selected Technical drawing concept?

Research Methodology

Research Design

This study was design and development research of the model type (Richey, Klein & Nelson, 2004) which dealt with the design, development, validation and use of models. The population for this research consists of basic technology teachers, computer experts and educational technology experts. Convenient sampling technique was used to select three senior lecturers from Educational Technology Department university of Ilorin and three senior basic technology teachers from three secondary schools in Ilorin to validate the content of the basic technology for junior secondary school Class two (JSSII).

Research Instruments

Three research instruments were employed in conducting this study:

(i) Content Validation Assessment Report (CVAR); (ii) Technical drawing Expert Validation Assessment Report (TEAR); (iii) Educational Technology Experts Validation Assessment Report (ETEVAR);

(i) Content Validation Assessment Report (CVAR): This instrument contains ten statements which respondents were required to write their comments after using the virtual learning environments. These include: appropriateness of the virtual learning environment for teaching the chosen topics; clarity and simplicity of the virtual learning environments; suitability for the level of the students; the extent to which the contents cover the topics; possible errors in the suggested answers; the structuring of the virtual learning environments; and other comments on the grammatical errors, misrepresentation of the symbols in the virtual learning environments, among others. Furthermore, a space for free comments was also provided. This instrument was given to three senior lecturers from Educational Technology Department, University of Ilorin for face and content validation of the virtual learning environments for Technical drawing with regards to the officially prescribed content of National Education Research and Development Council's.

(ii) Educational technology experts' assessment report: This instrument was designed to access the extent to which the contents, procedures, and the presentation of Virtual Learning Environment conformed to educational technology standards. The instruments was given to experts in the Department of Educational Technology for experts validation of the Virtual Learning Environment. The questionnaire will be administered to five Educational Technology experts from the University of Ilorin. The five experts from the Department of Educational Technology validated the instrument. Their professional comments, observation, and suggestions will be used to produce the final drafts of the instrument. The questionnaire consisted of two sections. Sections A will be on demographic data of respondents. Section B will contain items to access the developed instructional package. It will be rated based on: Strongly Agree (4), Agree (3), Disagree (2), Strongly Disagree (1).

Technical drawing Expert Validation Assessment Report (TEAR): The instruments were given to five experts in University of Ilorin for expert validation of Virtual Learning Environment in teaching a selected Technical drawing course. The questionnaire consisted of two sections. Section A was on demographic data of respondents. Section B will contain items to access the developed instructional package. It was rated on: Strongly Agree (4), Agree (3), Disagree (2), Strongly Disagree (1).

Method of Data Collection

Data were collected in two ways using qualitative and quantitative methods. Qualitative data on virtual learning environments were collected from Educational Technology Experts, Technical drawing experts. The experts responded to statements in: (i) Content Validation Assessment Report (CVAR); (ii) Technical Expert Validation Assessment Report (TEAR); (iii) Educational Technology Experts Validation Assessment Report (ETEVAR) respectively.

Data Analysis

Research question one was answered by explaining the steps involves in developing Virtual learning environments. Research question two was answered using qualitative data and quantitative data. The summary of comments and recommendations from experts on validation were reported and were analyzed using descriptive statistics of mean and standard deviation.In taking decision from the analyzed data, an average mean of 2.50 and above were considered as agreed, while an average mean of 2.49 and below was considered disagreed with respect to the research questions. A mean of 2.5, according to David (2005), was used as a criterion to judge mean scores for a modified four- point item format. The mean of 2.5 was calculated from the sum of 4+3+2+1 divided by 4.

Results

Research question one: What are the processes involved in the development of virtual learning environment on technical drawing concepts?

The virtual learning environment was design and developed based on the ADDIE model. The ADDIE model is a basic instructional model that has commonly been used in the development of a teaching and learning tool (Dick & Carey, 1996). The model consists of five different but interrelated phases: analysis, design, development, implementation and evaluation phase. The details of the five phases were elaborated further in the development phases below.

Analysis Phase

It was decided that the instructional platform design was to be a virtual learning environment for learning technical Concept, as the primary topic of learning for the instructional design.

Design Phase

The design phase involves the process of transforming the idea and concepts into something that is tangible and visual. Thus, the virtual learning environment was developed based on the three aspects of virtual learning environment developed which are: interactional, information and representation. The details of each aspect were as follows:

Interactional Design: involves the process of designing the virtual learning environment contents by creating an account through Edmodo platform and determining how the users gain controls of the platforms.

Information Design: deciding on how the information is to be presented to the users. These includes assessment, Learning Strategy, Learning standard, and objectives.

Representation Design: planning the layout of the virtual learning environments with regards to three elements: color, scheme, font and graphic. That is the suitable graphic Combination asymmetry and symmetry layout. At design stage, the entire framework and architecture of the virtual learning environments in Technical drawing was thus constructed and designed.

Development Phase

This third phase of the development of the virtual learning environments involves the actual process of writing and preparing the assessment materials of the virtual environments. This also includes creating an account on the Edmodo platform and inviting students through the same platform and then upload the subjects contents for the students view.

Implementation Phase

Implementation phase involves the process of putting the developed virtual learning environments into the real world. The virtual learning environment was validated by the developer as a self check, by an ICT expert and also by the developer's supervisor. The validation by ICT experts were to obtain feedbacks in regards to the content, strategy, graphic, text of the virtual learning environments.

Evaluation Phase

To determine the quality of the virtual learning environments, responses were obtained via experts rating guide. For the rating guide, 5 Educational Technology experts and 5 Technical drawing experts were surveyed.

Research question Two: How do (educational technology and Technical drawing) experts rate the developed virtual learning environment for teaching a selected technical drawing concept?

Table 1: Educational Technology Experts Rate the Developed Virtual Learning Environment for Teaching a Selected Technical Drawing Concept

S/N	ITEMS	Mean Rating
1	The content is structured in a clear and understandable manner.	3.40
2	The structure allows learners to move around freely in Different units.	3.60
3.	The structure of the package permits learners to advance, review, see example, repeat the unit, or escape to explore another unit.	3.60
4	The package facilitates learning by doing	3.20
5	The package allows learners to work on their own pace.	3.60
6	The package allows learners to discover information Through active exploration.	3.60
7	The quality of the text, image, and graphics are good	3.60
8	The package provides printing capabilities	3.80
9	The presentation of information can captivate the attention of student	3.90
	Grand Mean	3.90

Table 1 indicates the mean responses of Educational Technology experts on the developed virtual learning environments. Using a bench mark of 3.0, the grand mean result revealed that the mean score for each of the ten (9) items on the questionnaire is above, while, the grand mean score of all the ten (10) items is 3.90. This indicates that Educational Technology experts rate the developed virtual learning environments suitable for learning.

Table 2: Evaluation of Technical Drawing Expert on the Developed Virtual Learning Environment

S/N	ITEMS	Mean Rating
1	The content of the course material you have been given to go through conforms to standard.	3.76
2	The subtopics have been sequentially and coherently arranged.	3.78
3.	The language used in the course manual is simple and easy for both teachers and students.	3.67
4	The diagram in the package are clear and capture attention.	3.65
5	The content is sufficient to achieve the obtained objectives for the selected topics in Technical drawing.	3.47
6	The evaluation questions for each lesson are relevant for the	3.87

	attainment of the lesson objectives.	
7	The students self evaluation questions are relevant to the Student understanding of the course content.	3.60
8	The package facilitates learning by doing.	3.45
9	The package promotes collaborative learning.	3.33
10	The package allows learners to work on their own pace.	3.33
	Grand Mean	3.95

Table 2 indicates the mean rating of Mechanical engineering experts on a developed virtual learning environment in technical drawing. The table revealed that the grand mean score of the Technical drawing experts' rating of the developed virtual learning environments in Technical drawing is 3.95 which is higher than the benchmark of 3.00. This implies that the developed virtual learning environments in Technical drawing was well structured and every expectation in the developed virtual learning environments was achieved.

Discussion

The steps in developing virtual learning environments was used to answer research question one. Findings on the steps in the development of virtual learning environments for secondary school Technical drawing in Nigeria showed that using instructional system design procedures by ADDIE (2005) in developing virtual learning environments was successful. This finding is in line with the recommendations of Dick (2005),who affirm that components such as instructor, learners, materials, instructional activities, delivery system and learning and performance environments interact with each other and work together to bring about the desired student learning outcomes. The finding is also in agreement with Singh (2009) study which suggested that using a systematic approach such as ADDIE to develop a valid and effective interactive virtual learning environment was still viable. It also agreed with the finding of Lalaye (2016) who reported that adopted design model provided by Ina, Fourie in (1994) and the social constructivist learning theory take less time and effort as it starts with specific set of prescribed objectives.

Findings on how virtual learning environments for Technical drawing in Nigeria can be validated was revealed that experts and students' validation reports were positive. This finding agrees with the finding of Laleye (2016) who reported that reaction from the validating team and students' field trial validation revealed that the development of computer assisted instructional package is valuable for learning Technical drawing. The finding of this study also agrees with the finding of Özkök (2013) who revealed that the virtual learning environment is valid and reliable measure of Turkish students perceived virtual learning environments traits.

Conclusion And Recommendation

Literature revealed that there is few virtual learning environments developed through EDMODO platform and validated to facilitate teaching and learning of practical-based science subjects particularly Technical drawing in Nigeria. This study demonstrated the steps in developing and various stages of validating a virtual learning environment for Technical drawing in Nigeria. Adopting ADDIE model in developing virtual learning environments was successful. In addition, contents specialist reported that the contents covered the required Technical drawing concepts. Educational technology experts reported that simplicity, clarity, unity among illustrations, and emphasis on key concepts, colour use, and font type and sizes were adequate. The study therefore recommended that Technical drawing teachers should imbibe the spirit of using virtual learning environments for teaching their students in order to enhance learning of technological concepts at secondary school level

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LANGUAGE EDUCATION CURRICULUM IN NIGERIA'S MULTILINGUAL CONTEXT: CHALLENGES AND PROSPECTS

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ABSTRACT
The multilingual situation in Nigeria poses some problems to language educators and language policy makers. First among these problems is the adoption of a Nigerian national language and secondly, the development of indigenous languages as media of instructions in our primary, post-primary and even in tertiary institutions. The focus of this paper therefore is on the need to develop Nigerian Languages for use in our institutions. Necessary steps and the likely pedagogical problems that are envisaged are discussed while appropriate recommendations are made in this paper.

Key Words: Multilingualism, Indigenous Language, Media, Pedagogy, Excoglossic, Demulcents and Ethnolects

Introduction
That Nigeria is a multilingual nation is a fact too obvious to be over stressed and suffice to say the least, that Nigeria can best be described as a sociolinguistic giant with no definite or universally accepted number of languages. Elugbe (2012) put the number of languages spoken in Nigeria at 430, while Hansford et al (2010) put it at 400. Ayo Bamgb0se (2011) revised, and Fafunwa (2008) put the number of Nigerian languages to be between 250 and 400. Whatever the exact number might be, one obvious fact about the languages is that all these languages are at varying stages of development. Emenanjo (2012) states that Nigerian languages are developing from purely "local", pre-literate" or "oral" languages to written, national and regional languages, with varying levels of written literature. Languages used in Nigeria have been classified in different ways and with different parameters.

Williamson (2010) shows five broad demographic classifications of languages spoken in Nigeria, to include: The Foreign or exoglosic languages, the Deccamillionairs or very large languages, the Millionaires or large languages, the Centimils or Ethnolects and the Chtnolects, that is the small languages.

The relevance of this sociolinguistic pyramid is to exemplify the well-known linguistic complexity of Nigeria and also to draw attention to the inequalities in the Sociolinguistic profiles of the respective languages.

Basic research question
This paper intends to identify the major challenges caused by the complex linguistic environment in Nigeria and proffer s0me workable solutions to them. That constitutes the major research gap which this study intends to fill. Succinctly Put:

What challenges does this multilingual situation pose to language education in Nigeria?

In any multilingual situation as this, one cannot avoid a kind of linguistic conflict, that is, the question of which language or languages should be used or selected as a national language and adopted to foster a sense of national unity. Practically, all ethnic groups are associated with languages. It may therefore be difficult for government to impose a language on other groups to the detriment of the other. This is why English Language still continues to enjoy its pride of place in Nigeria, thus putting the indigenous languages in great disadvantage when it comes to language teaching. As Lassa (2011) put it: "The learner is confronted with two contending languages, the Nigerian language which he has acquired and the foreign language (English) which is the medium of instruction. He thinks in one and learns in the other". Perhaps this is one of the problems which the national policy on education sets out to address. What then is the position of Nigerian languages in the national policy on education?

NIGERIAN LANGUAGES AND THE NATIONAL POLICY ONEDUCATION

The National Policy on Education (1995)states that:

The five main national objectives of Nigeria considered as necessary foundation for the National policy on Education include:

i. A free and democratic society
ii. A just and egalitarian society
iii. A united, strong and self-reliant nation
iv. A great and dynamic economy
v. A land of bright and full opportunities for all citizens.

Nigeria's philosophy of education is therefore based on the integration of the individual into a sound and effective citizen and equal educational opportunities for all at all levels of education.

This paper posits that the lofty ideals listed above can be better achieved through the development and use of indigenous Nigerian languages; not only in education, but also in conducting national businesses, including governance.
As far as education is concerned, perhaps the takeoff point in language education is the development of manpower for Nigerian languages. This further re emphasis the relevance of teacher education.

TEACHER EDUCATION

The UNESCO Hamburg Conference of 1969 revised in 2016, defined Teacher Education as:

> *Such institutionalized educational procedures that are aimed at the purposeful organized preparation in further education of teachers who are engaged directly or indirectly in educational activity as their life work... Teacher Education comprises all forms or stages of preparation of those who intend to devote themselves to the teaching profession and also include the study of academic disciplines which are seemingly not directly related to professional preparations.*

The simple meaning above is that teacher education is education for a profession, and a profession is known for its special skills, knowledge and attitudes.

Arising from the UNESCO definition above, this paper is of the view that professional teachers of major Nigerian languages be produced in large numbers, such that in no distant time, Nigerian languages will not only be a subject taught in schools, but will be the main medium of instruction or teaching in all our educational institutions, that is, from the primary school to the university levels, the roles which the English language is currently playing and in all, the teacher is the focal point. The professional teacher of language education virtually translates the lofty policy into reality. The teacher is the one who gives the practical interpretation of the education policy as far as teaching is concerned. Thus, he has vital roles to play as discussed below:

THE ROLES OF THE TEACHER IN FORMAL EDUCATION

Olagoke (2012) among others state that "No education system can rise beyond the quality of its teachers". Therefore, the success of any educational programme depends to a large extent on the teaching staff. It is the teacher who in the final analysis, translates policies into practices and programmes into actions.

Succinctly, Lassa (2011) put it that the teacher is:

The initiator of the learning process; the facilitator of the learning skills; the coordinator of the learning sequences; the assessor of the learning efficiency, and indeed, the pivotal element in the entire educational development.

In clear terms, the National Policy on Education (1995:17) states the goal of teacher education that will produce the desired teachers that have been so eulogized.

NIGERIAN LANGUAGES IN EDUCATION

Bamgbose (2011) opines that education is not only the basis of mass participation, but also a means of "upward social mobility, manpower training and development in its widest sense".

Mother tongue education in Nigeria should be seriously encouraged for children to learn the basic rudiments of modern technology in native languages. This is because education is crucial to national development. Learners all over do the thinking processes in first language or mother tongue. This paper also shares the belief of Alamu (2011) that the first language in which knowledge is processed is an important factor in the learning and thinking processes.

Emenajo revised (2012) also opines that:

> *If the Nigerian child is to be encouraged from the start to develop curiosity, initiative, industry, manipulative ability, spontaneous flexibility, manual dexterity..., he should acquire these skills and attitudes through his mother tongue.... This is where the average European or English child has a decided advantage overthe African counterpart. While the former is acquiring new skills during the first six years in the mother tongue, the latter is busy struggling with a foreign language during the greater part of his primary education.* WHAT A SERIOUS DISADVANTAGE ON THE PART OF THE NIGERIAN CHILD(Emphasismine)

The stand of this paper is that one way of stopping this disadvantage is to ensure that the mother tongue features as the primary medium of expression at the pre- primary and primary levels while it should be studied like any other core subject at the secondary and tertiary levels of education. Of course, this calls for production and provision of textbooks in the languages as well as training teachers in all the Nigerian languages.

Recommendations

Based on the discussions so far, the following proposals are made towards the use and teaching of Nigerian Languages at all levels of education.

There is need to constantly review, update and improve on the existing orthography of Nigerian languages.

Efforts should be geared towards developing the orthography of some other Nigerian languages that have no written form.

More textbooks, novels or short stories should be written in Nigerian languages, just as we have in Yoruba, Hausa, Igbo and some few other Nigerian languages. Similarly, posters and road signs should also be written in Nigerian languages.
The Educational Resource Council (ERC) should endeavor to sponsor programmes on book development in Nigerian languages to be used in our educational institutions.

Nigerian language learning centres should be established in each state of the federation, Such will help to develop the languages of the immediate environment of such centres.

Emphases should be placed on training and retraining of Nigerian language teachers. The National Teachers Institute (NTI) should take the lead in this regard.
The need to adequately fund Nigerian language education programmes and institutions is strongly recommended. Both federal and state governments should make adequate budgetary allocations to Nigerian language education through their ministry of education and relevant agencies or parastatals.

Government agencies like the Adult and Non formal Education (ANFE) should collaborate with relevant stakeholders to properly fund and execute Nigerian language education programmes.

The national policy on language education should be reviewed to reflect the use of mother tongue as a medium of expression in all classes at the primary school level.

Alamu's (2011) recommended that students, parents and the general public should develop positive attitude towards Nigerian Languages. This paper shares the view and further states that the suggestion should not only be taken serious, but also practically implemented. Nigerian languages give Nigerians national identity. Closely related to the recommendation above, this paper further recommends that an awareness programme on the function of, and the need for effective teaching and learning of Nigerian Languages (NL) should be organized by government and other agencies concerned with the development of Nigerian Languages.

Finally, there is the need for the establishment of a Nigerian Language Commission which should handle issues related to Nigerian Language policy and its implementation.

Conclusion

The multilingual phenomenon in Nigeria has been revisited in this paper. Efforts have been made to classify the languages in accordance with the population of speakers. The need for teacher education to work towards developing ALL the languages to the level already attained by Hausa, Igbo and Yoruba has also been discussed. No language community, no matter how small would agree to be relegated or marginalized by any other language community} no matter how large. To this end, the multilingual nature of Nigeria should be seen as an advantage which can be explored.

Recommendations have been made by this paper to language policy makers and teacher educators towards developing these "minority" languages by way of developing their orthographies, producing textbooks in them as well as training teachers that will provide the much needed manpower.

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LEARNING ABOUT AND UNDERSTANDING DIFFERENT INTERPRETATIONS OFFRACTIONS AND THEIR ROLE IN THE PRIMARY SCHOOL CURRICULUM.

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Abstract

In this increasingly technical world, economic and educational success in contemporary global culture and 21st century depends heavily on knowledge of mathematics. It is therefore critical that learner achievement in the primary school mathematics improves as this affects attainment at other levels of education. Fraction knowledge forms a basis for understanding a wide range of related concepts, including ratio, proportion, decimals, percentages, and rational numbers. Fractions have rich meaning and feature in mathematical areas such as algebra, geometry, probability and trigonometry. If learners have difficulty in understanding the many meanings of fractions, it is likely that they will also have difficulty in procedural competency in those areas. Consequently, it is the duty of primary school teachers who teach mathematics at that level to ensure that they make a concerted effort to bring to light, through their teaching, the many different interpretations of fractions and the role they play in the mathematics curriculum. Learners' difficulties with fractions stem from the different meanings or interpretations that fractions hold. It is therefore imperative that teachers should, themselves, have a solid understanding of fractions and their meanings and the different areas in mathematics where they are used. This paper therefore, focuses on the meanings of fractions and the different areas in mathematics where they are used. In addition, it unveiled some misconceptions learners have with fractions and suggested how to overcome these difficulties.

Key words: denominator, fraction, measure, numerator, operator, part-whole, quotient, ratio

Introduction

Fractions and their operationsare cornerstone of mathematical knowledge for pupils at primary school as it isfoundation for comprehending further mathematical concepts such as measurement, ratio, functions. Itis also inherent part of human life in that,not all daily problems that are encountered cannot be represented solely withinteger form.Fractions underpin many complex mathematical topics, including ratios, rates, percentages, proportions, proportionality, linearity, and slope, their importance is not limited to mathematical study. Fluency with fractions is also required for many activities of daily life these include: recipes, calculating discounts, comparing rates, converting measuring units, reading maps, and investing money. Fractions have rich meaning and feature in mathematical areas such as algebra, geometry, probability and trigonometry (Doyle, Dias, Kennis, Czarnocha, & Baker,2016).

However, fractions are among the most complex mathematical concepts that children encounter in their years in primary education and hard to be understood by pupils (Cemalettin&Tuğrul, 2012; Mohyuddin& Khalil, 2016). Similarly, studieshave shown that teachers and pre-service teachers, exactly like pupils, have some difficulties on fraction concept (Toluk-Uçar, 2009). In most cases, the topics of fraction tend to be taught meaninglessly by focusing merely on paper and pencil algorithm. Similarly, teachers' lack of knowledge related to selecting and applying proper media or manipulative for facilitating pupilss' learning is perceived as another obstacle in teaching fraction.In general, the concept of fractions in primary schools tends to be presented by considering part-to whole approach. Studies have suggested that one of the main factors contributing to this complexity is that fractions comprise a multifaceted notion encompassing five interrelated sub-constructs of: part-whole, ratio, operator, quotient, and measure (Doyle, Dias, Kennis, Czarnocha, & Baker,2016).

Many textbooks restricted the definition of fractions only as parts of wholes. This restriction might contribute to the low understanding of students about the basic concepts of fractions.

Similarly, in most mathematics classrooms, fractions are taught by means of instructional strategies that put conceptual knowledge aside. In addition, they tend to be exposed heavily with symbolic rule devoid of understanding.Because students find fractions complicated, they spend more time trying to memorize the rules for calculations rather than spending time trying to understand them. This leaves those students with a very thin layer of knowledge regarding fraction calculations. And any memory loss of one of the rules will result in a misconception about that rule that might stay if uncorrected for a long time, and even through their college years.

Sub-constructs of fractions

According to Pienaar (2014) learners' difficulties with fractions stem from the different meanings or interpretations that fractions hold, depending on the tasks wherein the fractions appear and the teaching methods employed.The concept of fractions consists of five sub-constructs, namely, part-whole, ratio, operator, quotient and measure. Associated with these sub-constructs are the computations ($+, -, \times, \div$). If learners are taught about what are called the sub-constructs and how these relate to computations of fractions, there may be less confusion and more understanding of the meanings of fractions.

Part-whole.

In an effort to make pupils' introduction to fraction easier, some teachers havelimited fraction instruction to the part of a whole model. The part-whole models of fractions conveniently help produce fractional language however; this fractionallanguage produces a definition that limits the teaching that has accompanied the part-whole model of fractions (). Such as, there are four parts and you take three of them (for three quartersor $\frac{3}{4}$). Thisdefinition makes fractions greater than1 (improper fractions) almost nonsensical. The term *improper fraction* is used to describe fractions that are greater than one, such as $^7/_4$.

This term can be a source of confusion as the word *improper* implies that this representation isnot acceptable, which is not the case at all. Instead, try not to use this phrase and instead use "fraction greater than1."Following the part-whole definition above, pupils may for example read $\frac{7}{4}$ as there are four parts and you takes seven of them (seven quarters). It can be properly put: "If we have$\frac{7}{4}$, the 4 tells the name or size of the parts (fourths) and the 7 tells us that we have 7 of those fourths (or $2\frac{1}{3}$)"

One-fourth	two-fourths	three-fourths	four-fourths

five-fourths	six-fourths	seven-fourths	eight-fourths

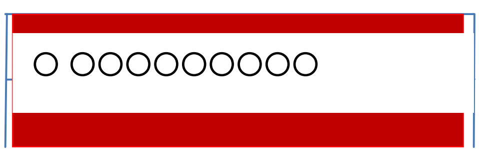
In some classrooms the use of the part-whole model was limited to a whole pre-divided into equal parts with pupils drilled in a procedure: count the shaded pieces write this as the top number, and then count all the pieces and write this as the bottom number (Abdul Ghani&Maat,2018). Although counting without attending to thesize of the pieces gives a correct answer when the diagram is divided into equal parts. However, if thesame procedure is applied to diagrams with non-equal parts an incorrect answer results.For example, pupils may think that the shape below shows $^3/_4$ red, rather than $^1/_2$red.

Ratio

Ratio is a comparison of any two quantities.For example the fraction $\frac{1}{4}$can mean that the probability of an event isone in four. Ratios can be part□part or part□whole. For example, the ratio $\frac{3}{4}$could be the ratioof those wearing jackets (part) to those not wearing jackets (part), or it could be part□whole,meaning those wearing jackets (part) to those in the class (whole). Similarly, if there are $24\,boys$ and $16\,g$irls in a class. The ratio of boys to girls is $\frac{24}{16} = \frac{3}{2} = 3:2$ (part-part), while the ratio of boys to the class is $\frac{24}{40} = \frac{3}{5} = 3:5$

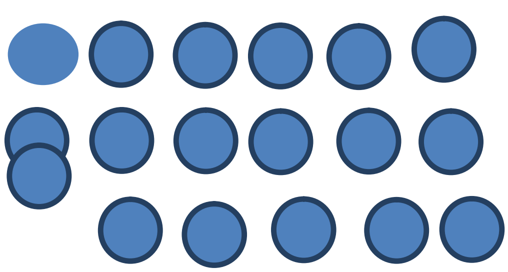
Properly used, tools can help students clarify ideas that are often confused in a purely symbolic model. Sometimes it is useful to do the same activity with two different representations and ask students to make connections between them. Different representations offer different opportunities to learn (Trivena, Ningsih&Jupri, 2017).

The whole is 25 counters, what is the ratio of red counters to whitecounters? What is the ratio of white counters to the whole counters?



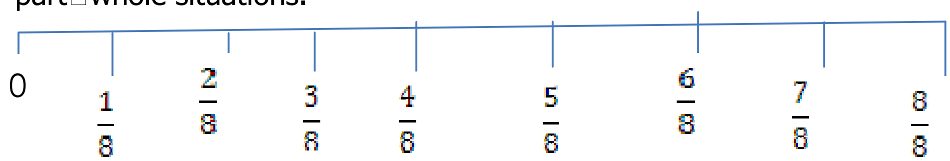
Operator

Fractions can be used to indicate an operation, as in $\frac{4}{5}$of 20square feet or $\frac{2}{3}$ofthe audience was holding banners. Zhang (2016) viewed fraction as an operator as an increase or decrease in the number of items in a set of discrete objects. A real world fraction situation can be presented. 18 cupcakes were baked for a birthday party and $\frac{2}{3}$ of the cupcakes were eaten. Ask pupils to determine: (i) how many cupcakes were eaten. (ii) how many were left.



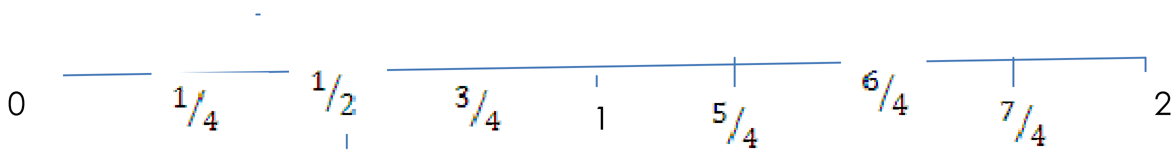
Division
Consider the idea of sharing ₦10 with 4 people. This is not a part□whole scenario, but it still means that each person will receive one□fourth ($\frac{1}{4}$) of the money, or $2\frac{1}{2}$Naira. Division is often not connected to fractions, which is unfortunate.

Measure
Measurement involves identifying a length and then using that length as ameasurement piece to determine the length of an object. For example, in the fraction $\frac{5}{8}$, you canuse the unit fraction $\frac{1}{8}$as the selected length and then count or measure to show that it takes fiveof those to reach $\frac{5}{8}$. This concept focuses on how much rather than how many parts, which is thecase in part□whole situations.



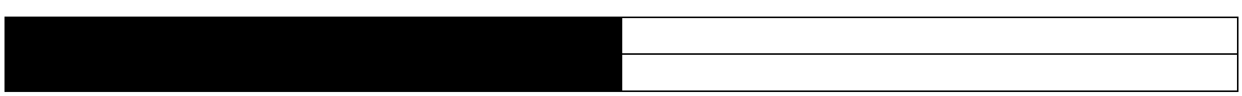
Misconception 1
Students think that the numerator and denominator are separate values and have difficulty seeing them as a single value. It is hard for them to see that $\frac{2}{5}$is one number.

How to Help: Find fraction values on a number line.



Like with whole numbers, the number line is used to compare the relative size of numbers. Importantly, the number line reinforces the fact that there is always one more fraction to be found between two fractions. Avoid the phrase"one*out of* four" (unless talking about ratios or probability) or "one over four." Instead, say"one-*fourths*".

Misconception 2
Students do not understand that $^2/_3$means two equal□sized parts (although not necessarily equal-shaped objects). For example, learners may think that the shape below shows $^1/_3$ rather than $^1/_2$ (Ojose, 2015)



To overcome this, ask learners to create their own representations of fractions across various manipulatives and on paper. Provide problems like the one illustrated above, in which all the partitions are not already drawn.

Misconception 3
Pupils may think that a fraction such as $^1/_4$is smaller than a fraction such as $^1/_7$because 4 is less than 7. Conversely, pupils may be told the reverse—the bigger the denominator, the

smaller the fraction. Although this may be true for unit fractions, teaching such rules without providing the reason may lead students to over generalize that $^1/_5$ is more than $^7/_{10}$.

How to Help: Use many visuals and contexts that show parts of the whole. For example, ask

fig. 1

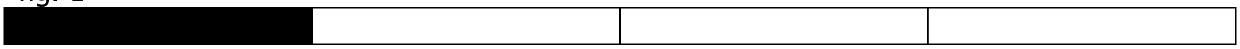


Fig. 2

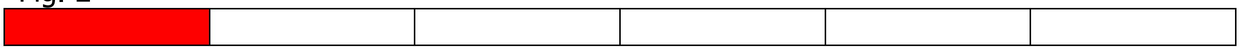


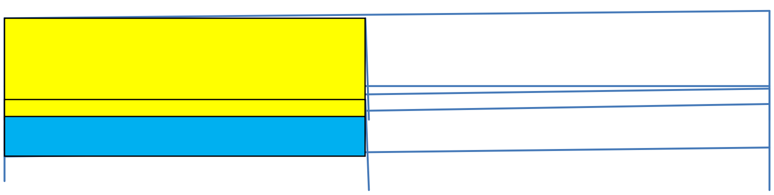
Fig (1) shows $^1/_4$, that is a whole is divided into 4 equal parts and 1 part shaded.

Fig (2) shows $^1/_7$, that is the same whole is divided into 7 equal parts and 1 part shaded. For example, ask which area is more. The pupils will observed that $^1/_4 > {}^1/_7$.

Misconception 4

Pupils mistakenly use the operation "rules" for whole numbers to compute with fractions—for example, $^1/_2 + {}^1/_2 = {}^2/_4$

How to Help: Use many visuals and contexts. Pupils who make these errors do not understand fractions. Until they understand fractions meaningfully, they will continue to make errors by over applying whole-number concepts. The most effective way to help pupils reach higher levels of understanding is to use multiple representations, multiple approaches, and explanation and justification.

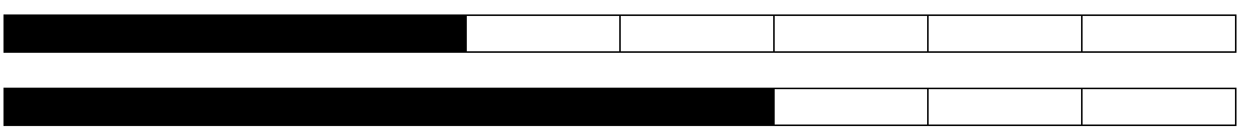


Some pupils are able to make sense of one representation, but not another. Importantly, pupils need to experience fractions in real-world contexts that are meaningful to them.

Comparing fraction

The term *whole number dominance* is inappropriate generalisations about whole numbers used in fraction comparisons by pupils (Alghazo,&Alghazo, 2017). Four of these whole number dominance misconceptions are described below.

1. *Same-size whole (same denominators).* To compare $\frac{3}{8}$and $\frac{5}{8}$, think about having 3 parts of something and also 5 parts of the same thing.



2. *Same number of parts (same numerators) but different-sized wholes.* Consider the case of $\frac{3}{4}$and $\frac{3}{7}$. . If a whole is divided into 7 parts, the parts will certainly be smaller than if divided into only 4 parts, therefore, $\frac{3}{4}$ is the larger fraction

3. *More than/less than one□half or one.* The fraction pairs $\frac{3}{7}$ versus $\frac{5}{8}$ and $\frac{5}{4}$versus $\frac{7}{8}$ do not lendthemselves to either of the previous thought processes. In the first pair, $\frac{3}{7}$is less than half of the number of sevenths needed to make a whole, and so $\frac{3}{7}$ is less than a half. Similarly, $\frac{5}{8}$ is more than a half. Therefore, $\frac{5}{8}$ is the larger fraction. The second pair is determined by noting that one fraction is greater than 1 and the other is less than 1.

4. *Closeness to one□half or one.* Why is $\frac{9}{10}$ greater than $\frac{3}{4}$? Each is one fractional part away from one whole, and tenths are smaller than fourths. Similarly, notice that $\frac{5}{8}$ is smaller than $\frac{4}{6}$ because it is only one□eighth more than a half, whereas$\frac{4}{6}$ is a sixth more than a half. Can you use this basic idea to compare $\frac{3}{5}$ and $\frac{5}{9}$

Conclusion

Fractions and their operations are cornerstone of mathematical knowledge for pupils at primary school as it is foundation for comprehending some mathematical topics, including ratios, rates, percentages, proportionality, linearity, and slope. Fluency with fractions is also required for many activities of daily life these include: recipes, calculating discounts, comparing rates, converting measuring units, reading maps, and investing money. Fractions have rich meaning and feature in mathematical areas such as algebra, geometry, probability and trigonometry. Studies have shown that fraction is one of the most difficult concepts to learn and teach. This was partly attributed to teachers' knowledge of fraction sub-construct.

Pupils need significant time and experiences to develop a deep conceptual understanding of this important topic. Understanding a fraction is much more than recognizing that $\frac{3}{5}$is three shaded parts of a shape partitioned into five sections. Understanding fractions means understanding all the possible concepts that fractions can represent.Fractions have numerous constructs and can be represented as areas, quantities, or on a number line. Therefore, it is absolutely critical that teachers teach fractions well, present fractions as interesting and important, and commit to helping learners overcome misconceptions associated with fractions.

Recommendations

In view of the important position fraction occupied and the challenges faced by both the teachers and pupils in understanding it, the following recommendations are offered:

1. One of the commonly used meanings of fraction is part□whole. But pupils would understand fractions better with more emphasis across other meanings of fractions.
2. Teachers should avoid the use of phrase "three *out of* four" or "three over four."For $^3/_4$instead, say "three -*fourths*
3. The term *improper* fraction ($\frac{9}{7}$) can be a source of confusion as the word *improper* implies that this representation is not acceptable, which is not the case at all. Instead, use "fraction greater than1.
4. Teachers should teach fractions using different representation.

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INSTRUCTIONAL ISSUES IN IMPLEMENTING COMPUTER–ASSISTED COMPONENT OF SENIOR SECONDARY SCHOOL TECHNICAL DRAWING CURRICULUM IN BENUE STATE

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Abstract
*The study sought to unravel the instructional issues in implementing computer-assisted component of senior secondary school Technical Drawing curriculum. Four (4) research questions and two (2) null hypotheses guided the study. The population was 178,064 (64 technical drawing instructors &178,000 senior secondary school students). Taro-Yamane's (2004) formula (**n = N/1+N [E]^2**) was employed to obtain a sample size of 400. A disproportionate stratified random sampling procedure was used to select 48 Technical Drawing instructors and 352 senior secondary school students from 50 secondary schools across educational zone A, B and C in Benue State. A Technical Drawing facilities requirement checklist obtained from Nigeria Education Research and Development Council (NERDC) was used to gather data on research question 2. Also, a 10-item self-structured closed ended questionnaire was deployed to collect data on research question 1, 3 and 4. The questionnaire was face validated by three senior academics in the area of technology education from Benue State University, Makurdi, Benue State. Cronbach's alpha technique was used to establish the internal consistency of the questionnaire which yielded a reliability index of 0.78. In line with the study design, the descriptive statistics of frequency and percentages was used to answer research question 1 and 2 whilst mean was used to provide answers to research question 3 and 4. The inferential statistics of t-test for independent sample was used to test the null hypotheses at 0.05 level of significance. Findings of the study revealed that the required facilities for implementing computer-assisted technical drawing are not available and the instructional methods used for teaching computer-assisted technical drawing are not suitable. The study recommended among others that Government, school heads and administrators should partner with appropriate private organization to assist in procuring the needed facilities for the successful implementation of the CATD component of the TD curriculum at the secondary school level.*

Introduction

Innovation in Computer Technologies (CTs) has dramatically altered the working pattern of diverse occupations. A significant number of industries, businesses, professions and organizations now find solace in the use of computer (an electronic device) for the conduct of its activities and operations. Al-Qawasmi (2005) corroborated that computers have transformed the way and manner people conduct businesses and perform their daily tasks. Similarly, Ukoha (2018) posited that the advent of computer among other new technologies in industries have transformed job contents and brought about novel work practices and procedures. Consequently, the practice of Technical Drawing (TD) has equally been affected by the application of computers as there are several computerized TD packages now available for use (Labe & Upwa, 2017). TD sometimes denoted with nomenclatures such as Building/Engineering Drawing (BED), Technical Graphics Communication (TGC), Engineering Drawing (ED) and many more is so old that its history is virtually that of humanity, and it closely parallels human technological progress (Bertoline &Wiebe, 2003).

Regardless the nomenclature, be it BED, TD, TGC or ED, the contents and practices find a common domain. According to Bertoline and Weibe (2003), TD is a real and complete language used in the design process by engineers, technologists, technicians, crafts persons and other technical personnel for visualization, communication and documentation of designs. Adadu; Aho; Nevkar; Jatau and Jibrin (2018) averred that TD is the common language understood by architects, builders, quantity surveyors and all fields of engineering when it concerns construction or manufacturing or production. Drawing sare key component in engineering, construction and manufacturing industries. For any product to be manufactured, produced or constructed, it must first and foremost, be conceptualized as a design idea with all the necessary sketches put in place (Leach, 2000). Researchers such as Bertoline and Wiebe (2003); Oyebode, Adebayo and Olowe (2015);Adadu, *et al* (2018) observed that long before now, TD was manually created with the aid of instruments such as drawing board, T-square, drawing sets, lettering templates, scale rule, protractor, compass to mention but a few. However, the advent of computer technologies in the field of engineering has shifted attention from the use of primitive instruments and tools as mentioned above to the use of Computer-Aided Drawing (CAD) software for engineering graphics design and drafting purposes. The use of computers for production of TD has changed the methods and tools, as well as the standards and conventions, evolving from instruments to drafting machine to CAD (Bertoline & Wiebe, 2003). According to Becker (as cited in Labe & Upwa, 2017), CAD as a refinement of manual design and drafting techniques is now widely used in the engineering industry and its future use will no doubt increase. Concurrently, the Nigerian Educational Research and Development Council [NERDC], (2007)stated that increased use of computer technologies in the field of engineering means that secondary school programmes should emphasized the use of Computer-Assisted Technical Drawing (CATD) if they wish to prepare students to use contemporary technology such as CAD.

In realization that only the inculcation of 21stcentury knowledge and skills can really position her school children to be abreast with global trends upon graduation, the Federal Republic of Nigeria (FRN)through (NERDC, 2007)restructured the curriculum of Senior Secondary School (SSS) with a view to accommodating contemporary scientific and technological innovations. The prominent feature in the said curriculum as observed by Labe and Upwa (2017) was the inclusion of CAD within TD which is one of the technology subjects at SSS level. The (Federal Republic of Nigeria [FRN],2014) through its National Policy on Education (NPE) in section 3, paragraph 35, p.17describes Senior Secondary Education (SSE) as a Post-Basic Education and Career Development (PBECD) education that children receive after successful completion of ten years of Basic Education (BE) and passing the Basic Education Certificate Examination (BECE) and Junior Arabic and Islamic Studies Certificate Examination (JAISCE). The NPE further states that, PBECD includes: (i) Senior Secondary Education and; (ii) Higher School Education as a means of preparing individuals for the world of work, wealth creation and entrepreneurship. According to Labe and Upwa (2017),the introduction of CAD into SSS curriculum was to enable the trainees get themselves acquainted with the basic working tools of CAD software and develop requisite modern day drafting skills in preparation for picking up draughtsmanship jobs and, or further their studies in the area of engineering and technology at the tertiary education level.

CAD as described by Bertoline and Wiebe (2003), Narayan (2008), Tickoo, Bhatt, Kishore and Verma (2014); and Wikipedia (2019) is the use of computer systems or workstations to aid in the creation, modification, analysis, or optimization of TD. CAD software is used to increase the productivity of the designer, improve the quality of design, improve communications through documentation, and to create a database for manufacturing and construction (Narayan, 2008). Leach (2000) observed that CAD produced drawings are capable of attaining 100% accuracy; an attribute that cannot be found in manual drafting, because CAD recognizes and store values to 14 decimal places which depict high precision level. The ability to use computer technologies for design and drawing are very essential part of the skill requirements of SSS graduates who offer TD. This is the reason TD is made one of the technology subjects at SSS curriculum and compulsory for all construction trades and engineering crafts students in Science and Technical Colleges (National Board for Technical Education [NBTE], 2011).

CATD is a component of the SSS TD curriculum. Tanner and Tanner (as cited in Afaor; Upwa; Tyav; Shinshima & Nule, 2016) defined curriculum as planned and guided learning experiences and intended learning outcomes formulated through the reconstruction of knowledge and experiences systematically developed under the auspices of the school, to enable the learner to increase his or her control of knowledge and experience. Ahmadi and Lukman (2015) defined curriculum as the set of courses and its contents offered at a school. According to the duo, curriculum is prescriptive and is based on a more general syllabus, which merely specify what topics must be understood, and what level to be achieved in a particular grade or standard. According to Utulu (2007), curriculum can be conceptualized in three ways:(i) as a course of study especially in higher institutions like university, (ii) document kept by schools containing the content (subject) to be taught to learners; in this case TD, and (iii) as the entire programme of study and activities supervised by the school. The TD curriculum was developed with the specific objectives of: (i) provide an understanding of theories and concepts relating to the use of ICT to facilitate visual communication of ideas in the construction and production industries; (ii) provide introduction to modern drawing studio practice; (iii) lay the foundation for technological development and further studies in building and engineering and , (iv) stimulate, develop and enhance entrepreneurship skills in the diverse areas of drawing studio practice (NERDC, 2007).

According to Akuezuilo (2006), no matter the rich content of a curriculum, only its proper implementation can cause the desirable impact. Ojonugwa (2018) viewed curriculum implementation as putting into practice the officially prescribed courses of study, syllabuses and subjects. Ojonugwa further noted that the process involves helping the learner to acquire knowledge or experiences as contained in the curriculum through instructional strategies. Instruction is the manner in which the teacher selects and mixes the various aspects of knowledge contained in the curriculum document or syllabus and presents to the learner to acquire the planned or intended experiences, knowledge, skills, ideas and attitudes that are aimed at enabling the same learner to function effectively in the society (Asebiomo & Sanusi, 2011).Despite several efforts to intensify the implementation of the CAD component of the TD curriculum in SSS, there are however, some challenges such as availability of requisite infrastructures, use of effective instructional strategies, qualification/experience of teachers and assessment/evaluation methods used in CATD among many other challenges.

Statement of the Problem

The advent of Computer Aided Drafting (CAD) in the construction and production industry has replaced manual drafting techniques since its inception in 1982 (Yare, 2012). Becker (as cited in

Labe & Upwa, 2017) noted that increased use of CAD in industry suggest that students need to be trained on the use of CAD in schools before graduation. In an attempt to catch up with global trends, the (NERDC, 2007) introduced CAD into the curriculum of SSS with a view to inculcating 21st century skills among students. Consequently, being able to measure whether SSS students are acquiring skills in CATD upon exist from school would be of great interest in such endeavour as examination, job recruitment, job training and project personnel allocation and value judgement. In such contexts, issues bordering on availability of requisite infrastructures, use of effective instructional strategies, qualification/experience of teachers and assessment/evaluation methods among many other challenges in CATD component of the SSS TD curriculum has to be urgently looked into. This is to ascertain whether students are acquiring 21st skill in TD that could better position them to compete globally. To neglect these issues that have been raised, will shutdown the possibility of making empirical data available to stakeholders in the educational sector for policy redirection and consideration, particularly as it concern CATD in SSS TD curriculum.

Purpose of the Study

The major purpose of this study was to look at issues of instruction in implementing Computer-Assisted component of senior secondary school Technical Drawing curriculum. Specifically, the study sought to:

1. Ascertain the qualification/experience of Computer-Assisted Technical Drawing (CATD) instructors;
2. Determine the infrastructural facilities available for teaching Computer-Assisted Technical Drawing (CATD);
3. Determine the instructional methods used in teaching Computer-Assisted Technical Drawing (CATD) and,
4. Determine the assessment methods used in assessing students learning outcomes in Computer-Assisted Technical Drawing (CATD).

Research Questions

1. What is the qualification/experience of CATD instructors?
2. What are the facilities available for teaching CATD?
3. What are the instructional methods used in teaching CATD?
4. What is the assessment methods used in assessing students learning outcomes in CATD?

Research Hypotheses

1. There is no significant difference between the mean response of TD instructors and SSS students on the instructional methods used in teaching CATD
2. There is no significant difference between the mean response of TD instructors and SSS students on the assessment methods used for assessing students learning outcomes in CATD

Methodology

The study used a descriptive survey design. The population was 178,064 which comprised 64 TD instructors and178,000Senior Secondary School Students (SSSS) drawn from 310 Senior Secondary Schools (SSS) within educational zone A, B and C in Benue State (Benue State Ministry of Education, Science & Technology Statistics Department [BSMEST], 2019). Hence the population was a heterogeneous one, Taro-Yamane's (2004) formula (***$n = N/1+N\,[E]^2$***) was employed to obtain a sample size of 400. A disproportionate stratified random sampling procedure was used to select 48TD instructors and 352 SSSS from 50 SSS across educational zone A, B and C. A TD facilities requirement checklist obtained from NERDC TD curriculum was used to gather data on research question 2. Also, A 10-item self-structured closed ended questionnaire weighted across a 4-point rating scale of Very Often (VO) = 4, Often (O) = 3, Rarely Used (RU) = 2 and Never Used (NU) = 1 was deployed to collect data on research question 1, 3 and 4. The questionnaire was face validated by three senior academics in the area of technology education from Benue State University, Makurdi, Benue State. Cronbach's alpha technique was used to establish the internal consistency of the questionnaire which yielded a reliability index of 0.78. In line with the study design, the descriptive statistics of frequency and percentages was used to answer research question 1 and 2 whilst mean and standard deviation was used to provide answers to research question 3 and 4. A percentage score of 50% and above was considered as 'Available' and 49% and below was regarded as 'Not Available' as decision rule for research question 1 and 2. Bench mark mean response for deciding on research question 3 and 4 was determined by adding the weight assigned to each response and dividing by 4 ***(4+3+2+1 = 10/4 = 2.50)***. Items with mean response of 2.50 and above were considered as 'Used' and items with mean response of 2.49 and below were regarded as 'Never Used'. The inferential statistics of t-test for independent sample was used to test the null hypotheses at 0.05 level of significance. The $\rho - value$and $\alpha - value$ were compared to decide whether a null hypothesis is to be retained or rejected. When $\rho \leq \alpha$, the null hypothesis was rejected and when $\rho > \alpha$, the null hypothesis was retained. The researchers conducted the analysis with the aid of Statistical Package for the Social Sciences (SPSS) 20.

Results and Discussion of Findings

Research Question One

What is the qualification/experience of CATD instructors?

Table 1

Qualification/Experience of CATD Instructors

S/N	Variable	Frequency (N)	Percentage (%)
	Qualification		
1	NCE (Tech)	32	66.67
2	HND/First Degree	13	27.08
3	Master's Degree	3	6.25
4	Doctorate Degree	Nil	
	Experience		
5	1-2years	8	16.66
6	2-5years	14	29.17
7	5-10years	9	18.75
8	10years Above	17	35.42

Result of data presented in Table 1 shows that 66.67% of TD instructors are holders of NCE (Tech), 27.08% holds HND/First Degree and 6.25% possessed Master's Degree. However, none of the 48 sampled TD instructors holds Doctorate Degree.

Research Question Two

What are the facilities available for teaching CATD?

Table 2

Frequency and Percentage of Facilities Available for the Teaching of CATD

S/N	Facilities	Available		Not Available	
		N	**%**	**N**	**%**
1	Computer Laboratory	**30576.25**		**95**	**23.75**
2	Public Electricity Supply	**84**	**21.00**	**316**	**79.00**
3	Electricity Generator	**21**	**5.25**	**379**	**94.75**
4	2D & 3D CAD Software	**15**	**3.75**	**385**	**96.25**
5	Multi-media Projectors	**14**	**3.50**	**386**	**96.50**
6	2D & 3D Printers	**0**	**0.00**	**400**	**100.00**
7	Scanning Machine	**5**	**1.25**	**395**	**98.75**
8	Laminating Machines	**4**	**1.00**	**396**	**99.00**
9	Spiral Binding Machines	**2**	**0.50**	**398**	**99.50**
10	Internet Services	**5**	**1.25**	**395**	**98.75**
11	Interactive Boards	**2**	**0.50**	**398**	**99.50**
12	Video Clips	**2**	**0.50**	**398**	**99.50**
13	Video cassette recorder/Player	**1**	**0.25**	**399**	**99.75**
14	Drawing Sheets	**301**	**75.2**	**99**	**24.75**
15	Compact Disk-Read Only Memory (CD-ROMS)	**12**	**3.00**	**388**	**97.00**
16	Flash Drive	**24**	**6.00**	**376**	**94.00**
17	Speakers	**18**	**4.50**	**382**	**95.50**

Result of data presented in Table 2 shows that of all the facilities needed for the effective and efficient implementation of CATD, only computer laboratory (76.25%) and drawing sheets (75%) are available in the sampled schools. Essential facilities such as public electricity (23.75%), electricity generator (79%), 2D & 3D CAD software (96.25%), multi-media projectors (96.50%) and internet services (98.75%) are not available among many others.

Research Question Three
What are the instructional methods used in teaching CATD?

Table 3
Mean of TD Instructors and SSS on Instructional Methods used in Teaching CATD

S/N	Instructional Methods	M_1	M_2	M_t	Remarks
1	Demonstration with practice	2.84	3.42	3.13	Used
2	Activity-oriented teaching	2.05	1.08	1.57	Not Used

3	Competency-based teaching	2.00	1.43	1.72	Not Used
4	Lecture method	1.89	2.00	1.95	Not Used
5	Individual project method	2.02	1.58	1.80	Not Used
6	Group project method	2.00	1.89	1.95	Not Used
7	Design studio visits	1.50	1.08	1.29	Not Used
8	Discussion method	2.78	2.89	2.84	Used

Result of data presented in Table 3 revealed that the most common instructional methods deployed by TD instructors for the teaching and learning of CATD is demonstration with practice (3.13) and discussion methods (2.84). However, suitable methods such as design studio visits (1.29), competency-based teaching (1.72) and activity oriented teaching (1.57) are not used by TD instructors in delivering CATD to students.

Research Question Four

What is the assessment methods used in assessing students learning outcomes in CATD?

Table 4

Mean of TD Instructors and SSSS on Assessment Methods used in Assessing Students in CATD

S/N	Assessment Methods	M_1	M_2	M_t	Remarks
1	Practical test	2.54	2.89	2.72	Used
2	Structured short answer questions	2.87	3.00	2.94	Used
3	Multiple-choice test	3.95	3.86	3.91	Used
4	Observation of trainees	1.57	1.45	1.51	Not Used
5	Oral test	1.08	2.00	1.34	Not Used
6	Essay test	3.85	3.00	3.43	Used

Result of data presented in Table 4 shows that the assessment methods used in assessing students in TD are practical test (2.72), structured short answer questions (2.94), multiple-choice test (3.91) and essay test (3.43). However, assessment methods such as observation of trainees (1.51) and oral test (1.34) are not used in assessing students in CATD.

Research Hypothesis One

There is no significant difference between the mean response of TD instructors and SSSS on the instructional methods used in teaching CATD

Table 5

Independent Sample t-test of TD Instructors and SSSS on the Instructional Methods used for Teaching CATD

Group	*N*	*M*	*SD*	*t*	*df*	*p-value*	*Remarks*
TD Instructors	48	2.14	4.50	0.45	398	0.61	NS
SSSS	352	1.92	4.70				

***NS** = Not Significant, **p** > 0.05, **df** = 398*

Result of data presented in Table 5 shows that the mean score of TD instructors and students on the instructional methods used for teaching CATD do not significantly differ, *t(398) = 0.45, p = 0.61.* This therefore, suggests that the null hypothesis is upheld.

Research Hypothesis Two

There is no significant difference between the mean response of TD instructors and SSSS on the assessment methods used for assessing students learning outcomes in CATD.

Table 6
Independent Sample t-test of TD Instructors and SSSS on the Assessment Methods used for Assessing Students in CATD

Group	*N*	*M*	*SD*	*t*	*df*	*p-value*	*Remarks*
TD Instructors	48	2.64	4.50	0.52	398	0.75	NS
SSSS	353	2.70	4.70				

NS = *Not Significant,* $\boldsymbol{p} > 0.05$, $\boldsymbol{df} = 398$

Result of data presented in Table 6 shows that the mean score of TD instructors and students on the assessment methods used for assessing students learning in CATD do not significantly differ, $t(398) = 0.52, p = 0.75$. This therefore, suggests that the null hypothesis is upheld.

Discussion of Findings

Result of data presented in Table 1 with regards to the qualification/experience of TD instructors shows that a vast majority of TD instructors within the study area are NCE (Tech) holders representing 66.67%. Furthermore, TD instructors with HND/First Degree and master's degree were found to represent 27.08% and 6.25% respectively. However, none of the TD instructors were found to have possessed a doctorate degree qualification. Although, a reasonable number (i.e 35.42%) of the instructors have 10years experience and above, 29.17% have 2-5years experience, 18.75% have 5-10years experience and 16.66% have 1-2years experience in teaching TD at the secondary school level. Even though NCE is the minimum qualification for teaching at junior secondary school level, it is not a sufficient qualification for teaching TD at senior secondary school level since the subject (TD) is not a junior secondary school subject. Akuezuilo (2006) corroborated that the successful implementation of any secondary school subject requires well experience and certified teachers with not less than 5years experience and holders of a minimum qualification of First degree. TD instructors ought not to limit themselves to first or master's degree alone. Instructors can also aspire to acquire doctorate degree in relevant fields for enhance knowledge and performance in the subject in which they teach.

Result of data presented in Table 2 shows that of all the facilities needed for the effective and efficient implementation of CATD, only computer laboratory and drawing sheets were found to be available in the sampled schools. Essential facilities such as public electricity, electricity generator, 2D & 3D CAD software, multi-media projectors and internet services are not available among many others. This finding is in line with that of Labe and Upwa (2017) which revealed that most of the requisite facilities such as mentioned above that are required for the effective and efficient teaching/learning of CATD are not adequate in science and technical colleges. According to NERDC (2007), facilities such as public electricity, electricity generator, CAD software, multi-media projects, internet service and many others must be readily available for the successful implementation of CATD. CATD is a technical education subject that requires psychomotor activities during implementation. It is worthy of note that psychomotor activities requires the manipulation and use of some facilities and equipment. The implication of this scenario is that secondary school students are not acquiring the needed knowledge in CATD due to lack or unavailability of the needed facilities.

Result of data presented in Table 3 revealed that the most common instructional methods deployed by TD instructors for the teaching and learning of CATD are demonstration with practice and discussion methods. However, suitable methods such as design studio visits competency-based teaching and activity oriented teaching are not used by TD instructors in delivering CATD to students. This finding is consistence with that of Asebiomo and Sanusi (2011) and Adadu *et al* (2018) which revealed that technical teachers or teachers in general do not select appropriate instructional strategies according to the nature of topics and subjects which they teach. CATD is a specialized component of the technical drawing curriculum that requires the selection and mix of suitable instructional methodologies such as design studio visits; competency-based instruction and activity oriented instruction in order to enable secondary school students acquire appropriate knowledge, skills and attitudes in CATD. This assertion is further buttressed by NERDC (2007) which stated that to successfully implement the CATD of the TD curriculum at the secondary schools; instructors must be able to select a mix of most suitable instructional strategies such as design studio visits, activity oriented and competency-based instructions.

Result of data presented in Table 4 shows that the assessment methods used in assessing students in TD are practical test, structured short answer questions, multiple-choice test and essay test. However, assessment methods such as observation of trainees, and oral test are not used in assessing students in CATD. This finding is in line with the recommendation by NERDC (2007) which listed assessment methods such as practical test, structured short answer questions and multiple-choice as the most appropriate for assessing students learning in CATD. The only means of establishing whether students have learned is when they are been assessed and evaluated with the valid assessment and evaluation methods. If the assessment methods are valid; the inference, conclusion and judgement can be said to be reliable.

Conclusion

With regards to the findings of the study, the paper concludes that the teachers teaching CATD are not qualified, though they have adequate experience in the teaching of TD at the secondary school level. Also, the facilities required for the effective and efficient implementation of CATD are not readily available for both teachers and students use. Furthermore, TD instructors are not applying appropriate instructional method for the teaching of CATD at the secondary schools. However, suitable assessment methods for assessing students' learning in TD as recommended by NERDC are being deployed by TD instructors for the purpose of assessing students learning in TD in secondary schools.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Government through Education Trust Fund (ETF) should embark on sponsoring secondary school Technical Drawing instructors for further training on the use of competency-based instruction for teaching CATD at the secondary school level.
2. Government, school heads and administrators should partner with appropriate private organization to assist in procuring the needed facilities for the successful implementation of the CATD component of the TD curriculum at the secondary school level.
3. Technical Drawing instructors should sponsored by government and school heads to acquire appropriate knowledge and skills in the use of suitable assessment tools, methods and procedures for assessing and evaluating students learning in CATD.

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ASSESSMENT OF FACTORS FOR SUCCESSFUL IMPLEMENTATION OF TECHNOLOGY EDUCATION CURRICULUM IN SECONDARY SCHOOLS IN PLATEAU STATE

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Abstract
The study assessed the essential factors for successful implementation of technology education curriculum in secondary schools in Plateau State. Two (2) research questions and null hypotheses were formulated to guide the study. A survey design was used for the study. The population of the study was 306 technology education stakeholders 193 technical teachers and 113 educational administrators (which comprised 110 school principals and 3 principal officers of the Ministry of Education]). The sample size of 170 respondents was obtained by Krejcie and Morgan standard table for determining the sample size of a known population. A 16 item structured questionnaire constructed by the researcher captioned: Implementation Factors of Technology Education Curriculum (IMFTEC) validated by 3 experts was employed as instrument for data collection. The reliability coefficient of 0.76 was obtained by Cronbach's alpha technique. The descriptive statistics of mean and standard deviation were used to answer the research questions whilst the independent sample t-test was used to test the null hypotheses at 0.05 level of significance. The findings of the study revealed that inadequate manpower and facilities are some of the major factors hindering the successful implementation of the technology education curriculum in the secondary school. The study recommended among others that education stakeholders must ensure that qualified teachers and the requisite facilities are provided for the smooth implementation of the secondary school curriculum.

Key Words: Assessment, Implementation Technology Education Curriculum.

Introduction
All over the world secondary education is undergoing rapid transformation. According to Wonnacott (2003), the changes are the result of the incredible speed and sophistication of technological change and innovations; creating new industries demanding advanced skills, knowledge and competencies; and changing the economic profile and social values of societies. This trend is placing pressure on the school systems requiring continuous adjustments of schools curricula at all levels particularly, the secondary education level. According to the Opoku, Afriye, Boateng and Acheampong (20122), globalization and the increasing demand for a more sophisticated labour force, combined with the growth of knowledge-based economies gives a sense of urgency to the heightened demand for secondary education. Similarly, the United Republic of Tanzania (URT)(2014) posits that secondary education is recognized by both developed and emerging economies as a strategic instrument for poverty reduction, wealth creation, employment generation and productivity in today's economy.

Against this background many developed and developing countries (Nigeria inclusive) have restructured their secondary education curricula and many regions are setting agenda for curricula reforms with the aim of introducing Technology Education (TE). According to Jones (2009), technology education for all students is a relatively new phenomenon in national and international curricula. Wonnacott (2003) further explains that, technology education is a transition of over 100 years of modifications of the early traditional apprenticeship training system to the Industrial Arts Education (IAE), and through many other names associated with the profession. Furthermore, Brewer (2010) declared that the different names by which the profession is called, the content and the practices characterize the major changes that took place in the field that led to the adoption of the present technology education.

According to New York State Education Department (NYSED)(2011) technology education is an integrated programme of instruction from the disciplines of science, mathematics, social sciences, engineering and language arts to stimulate and guide students' understanding in the design and development of systems, devices, and products to meet the needs and wants of the society. Technology education can also be seen as the planned programme(s) of learning in the different technology areas to develop students' talents and the capacity to design and create new or improved technologies to solve practical problems of the society. This is the major reason for the shift from the previous vocational and technical education systems that focused mainly on the development of job-specific skills, knowledge and attitudes for productivity and self-reliance.

The Nigerian education stakeholders and curriculum experts foresaw a new direction to launch a scientific and technological culture aimed at the industrialization of the nation (Dike, 2009). The indigenous secondary education curriculum provided fertile ground for valuable foundation for the Technical, Vocational Education and Training (TVET). The Technical, Vocational Education and training programmes for the first time were introduced into the secondary education curriculum and enjoyed parity with other traditionally valued subjects like science and mathematics as a major NPE thrust.

As a result, Nigeria adjusted her secondary education curriculum in 1982 to encompass diversified curriculum that integrated academic with technical and vocational subjects (vocationalization). The aim was to empower learners with the skills, knowledge and attitudes to be productive and be self-reliant (Ofoha, 2011). The JSS curriculum was both pre-vocational and academic and was to be free, universal and compulsory. Introductory technology was the component of TVET subject in the six core subjects in "Group A" of the JSS curriculum. Every student is to selection one subject each from group B and C in addition to the six core subjects in group A to meet the minimum of 10 or maximum of 13 subject requirements. However, students' in the SSS are to select in addition to the six (6) core subjects in group A, a minimum of one (1) or maximum of two (2) subjects from the electives in group B and C to make up a minimum of seven (7) and maximum of eight (8) as total subjects offered (FRN, 1981, revised 2004). This curriculum was targeted to achieve the objectives of secondary technical education and to introduce scientific and technological culture in the pursuit of industrialization of the nation.

Nwokolo-Ojo and Sen (2015)described curriculum as a deliberate, systematic and planned attempt undertaken by the school to modify or change the behavior of citizens of a particular society. Similarly, Pillai (2017) sees curriculum as a comprehensive plan for an educational training programme/course to offer new/improved manpower to fulfil the rising needs of a dynamic society. Curriculum can also be seen as the total selected, planned and systematically

organized experiences to be learned by the students' through instruction and guidance of the teacher in a school to effect desired changes in behavior. The definition of curriculum by Pillai offers a strong agreement with this study as technology education model targets to meet the changing needs of a modern society. The secondary technology education curriculum is currently a global concern and greater efforts are being strengthened towards effective implementation.
Curriculum implementation according to Maduewesi, Aboho and Okwuedei (2010)is "the task of translating the curriculum document into action by the combined efforts of the school authority, teachers and students". Similarly, Nojimu-Yusuf and Adebesin as cited in Alabi (2014) sees curriculum implementation as the actual hatching of the planned curriculum. Curriculum implementation can also be seen as an interactive and cooperative process in the timely supply of adequate and appropriate learning resources under the teacher's skilful and systematic management of learning processes to achieve desired learning outcomes. Effective Curriculum implementation is an imperative educational tool for national development.

The foreseen relevant skills, knowledge and attitudes to prepare the secondary school graduates in Plateau State to attain self-reliance and better socio-economic fortunes and to contribute to national development could not be realized (Ofoha, Uchegbu, Anyikwa & Nkemdirim, 2009). This condition is responsible for the rising youth unemployment and poverty (Gabriel, 2014). As a result, the increasing youth poverty, idleness and restiveness is making the socio-economic and political environment hostile, insecure, unstable and capable of down turning developments (Emeh, 2012). This failure is the bane of the nation's socio-economic and political woes today.

The educational scholars and researchers remarked that the 6.3.3.4 system of education failed because of poor implementation practices. According to Offorma, as cited in Ofoha (2011, p.78), the major problem encountered during the implementation of the Technical and vocational education programmes were the acute shortage of qualified technical teachers, inadequate standard workshops/ laboratories and facilities, inadequate instructional and training materials; as a result, students graduate without any hands-on- experience. Similarly Okolocha (2012) and Owuomanam (2015) submit that, inadequate funding and lack of motivation of teachers hindered success of the 6.3.3.4 education system. Gusau (2008) notes that, there was no sufficient preparation and strategic plans put in place by the government for the successful implementation of the system. In line with these submissions, the Commonwealth of Learning (CL) (2000) emphasized that, implementation will only be successful if there are sustained and sufficient quality resource materials and appropriate facilities and other relevant needs are provided. There is the suspicion that this could lead to greater danger in the future if the situation is not salvaged.

The new curriculum combinations were introduced to strengthen the achievement of the objectives of secondary schools technology education programmes. The nine (9) core technology subjects include: Technical drawing, general metal work, basic electricity, electronics, auto mechanics, building construction, woodwork, home management and food and nutrition. The implementation of the policy took effect from September 2014 (FRN, 2013). The fate of the new technology education programmes is a necessary question to ponder upon. This was the reason for the concern and interest of the researcher to assess the state of the current factors for the successful implementation of technology curriculum in secondary schools in Plateau State.

Statement of the Problem

The implementation of the technical and vocational education curricula began in 1982. However, about thirty years of the implementation, the targeted objectives/goals of secondary technical education could not be achieved. Consequently, youth unemployment, idleness, poverty and restiveness are on the rapid increase resulting in serious levels of socio-economic and political vices. There is the fear that this could lead to great danger in the future if the situation is not resolved. This worrisome situation is noticed by the government and all the education stakeholders that led to the new curricula review and the adoption of the current technology education among other changes. According to Offorma (as cited in Ofoha, 2011), the lack of adequate technical teachers, standard technical workshops/facilities. It is worth asking whether the implementation factors that characterized failure of the previous system are rectified to permit success of the current technology education. This is the motivation for the assessment of the factors for the successful implementation of technology education curriculum in Plateau State.

Purpose of the Study

The main purpose of this study is to determine the current state of the factors for the successful implementation of technology education curriculum in secondary schools in Plateau State, Nigeria. Specifically, the study seeks to ascertain the:

1. Current state of the teacher factors for the successful implementation of technology education curriculum.
2. Current state of facility factors for the successful implementation of technology education curriculum.

Research Questions

The following research questions were put-up for the study:

1. What is the state of the teacher factors for the successful implementation of technology education curriculum?
2. What is the current state of facility factors for the successful implementation of technology education curriculum?

Hypotheses

The following hypotheses (Ho) were formulated to guide the study:

Ho_1. There is no significant difference between the mean responses of educational administrators and technical and vocational teachers on the current state of teacher factors for the successful implementation of technology education curriculum.

Ho_2. There is no significant difference between the mean responses of educational administrators and technical and vocational teachers on the current status of facilities factors for the successful implementation of technology education curriculum.

Methodology

A survey design was used for the study. The population for the study was 306 which comprised 193 vocational and technical teachers and 113 educational administrators made up of 110 principals and 3 MOE board heads. The sample size of 170 was used for the study and obtained from Krejcie and Morgan standard table for determining the sample size (n) of a given population (N).A 36 item structured questionnaire titled: Assessment of factors for successful implementation of technology education curriculum in secondary schools in Plateau State developed by the researcher was used as instrument for data collection. The questionnaire was indexed on a four point- rating scale of strongly agree, Agree, Disagree and strongly disagree. The instrument for data collection was validated by three experts. A Cronbach alpha reliability technique was used to ascertain a reliability coefficient of 0.83. Data was collected through direct contact and analysed using the descriptive statistics of mean ($\bar{x}$) and standard deviation while independent samples t-test was used to test the Null hypotheses at 0.05 significant level.

Results and Discussion of Findings

Research Question One

What is the state of the teacher factors affecting the successful implementation of secondary schools technology education curriculum?

Table 1

Mean and Standard Deviation of Technical Teachers and Administrators on the Teacher Factors for successful Implementation of Secondary School Technology Education Curriculum (n_1 = 121, n_2 =49

S/N	Statement	$\bar{x}_1$	$\bar{x}_2$	SD_1	SD_2	$\bar{x}_t$	SD_t	Remarks
1	Experienced technology education teachers' are adequately available for teaching technology subjects in secondary schools	2.93	2.00	0.62	0.67	2.45	0.63	Disagree
2	Technical teachers are not properly motivated in secondary schools	3.17	33.25	00.79	00.68	33.19	00.76	Agree
3	Technical teachers are not committed in teaching technical subjects	2.46	2.43	0.87	0.85	2.45	0.86	Disagree
4	Technical teachers are not well informed on technology education curriculum policy	2.34	2.23	0.79	0.85	2.31	0.81	Disagree
5	There is adequate supervision of technology teachers in secondary schools	2.10	2.45	0.74	0.81	2.27	0.76	Disagree
6	Technical teachers do not have experience in selecting suitable teaching strategies	3.43	3.40	0.64	0.58	3.42	0.62	Agree
7	Technical teachers often motivate students' interest in their subjects	3.18	3.27	0.49	0.49	3.21	0.49	Agree
8	Technical teachers	2.19	2.70	0.84	0.79	2.44	0.83	Disagree

	received re-training in technology education curriculum							
	Subscale Mean & Standard Deviation	**2.73**	**2.72**	**0.72**	**0.72**	**2.72**	**0.82**	**Agree**

Key: $\mathbf{n_1}$= Number of technical teachers, $\mathbf{n_2}$ = Number of administrators, $\bar{x}_1$ = Mean of technical teachers, $\bar{x}_2$ = Mean of administrators, $\mathbf{SD_1}$ = Standard Deviation of technical teachers, $\mathbf{SD_2}$ = Standard Deviation of administrators, $\bar{x}_t$ = Mean total, $\mathbf{SD_t}$ = Standard Deviation total

Table 1 shows that the respondents (technical teachers and administrators) agreed that technical teachers are not properly motivated ($\bar{x}_t = 3.19, SD_t = 0.76$), technical teachers do not have the experience in selecting suitable teaching strategies ($\bar{x}_t = 3.42, SD_t = 0.62$**)** and technical teachers often motivate students interest in their subjects ($\bar{x}_t = 3.21, SD_t = 0.49$). The respondents however disagreed that: Experienced technology education teachers are adequately available ($\bar{x}_t = 2.45, SD_t = 0.63$), technical teachers are not committed to the teaching of technology subjects ($\bar{x}_t = 2.45, SD_t = 0.86$), technical teachers are not well informed about technology curriculum policy ($\bar{x}_t= 2.31, SD_t= 0.81$), there is adequate supervision of technology teachers in secondary schools ($\bar{x}_t= 2.27, SD_t= 0.76$), and technical teachers received re-training in technology education curriculum ($\bar{x}_t= 2.44, SD_t= 0.83$).Therefore, both respondents agree that the lack of proper motivation of technology education teachers', technology education teachers' inexperience in the selection of suitable instructional strategies, the inadequate availability of experienced technology teachers', the inadequate supervision of technology education teachers' and the lack of re-training of Vocational and Technical Education teachers' for technology education curriculum (Grand$\bar{x}_t= 2.72, SD_t= 0.82$), are the teacher factors challenging the successful implementation of technology education curriculum in secondary schools in plateau state.

Research Question Two

What is the current state of facility factors for the successful implementation of secondary schools technology education curriculum?

Table 2

Mean and Standard Deviation of Technical Teachers and Administrators on the Facility Factors for Successful Implementation of Secondary School Technology Curriculum (n_1 = 121, n_2 = 49)

S/N	Statement	$\bar{x}_1$	$\bar{x}_2$	SD_1	SD_2	$\bar{x}_t$	SD_t	Remarks
9	Standard workshop buildings available for the learning of technology subjects in secondary schools are inadequate	3.12	3.18	0.62	0.54	3.14	0.60	Agree
10	The tools available for the learning of technology subjects in secondary schools are	3.50	3.62	0.66	0.56	3.56	0.64	Strongly Agree

	inadequate							
11	Modern facilities are available for the learning of technology subjects in secondary schools	1.80	1.67	0.69	0.51	1.73	0.64	Disagree
12	There is lack of equipment for the learning of technology subjects in secondary schools	3.23	3.34	0.62	0.59	3.32	0.61	Agree
13	Personnel for the Maintenance of learning facility are readily available in secondary schools	2.32	1.62	0.78	0.72	1.97	0.77	Disagree
14	There is sustainable power supply for the learning of technology subjects in secondary schools	2.00	2.89	0.64	0.69	2.44	0.65	Disagree
15	There are no health and safety facilities for the learning of technology subjects in secondary schools	3.23	3.18	0.69	0.71	3.19	0.69	Agree
16	Machines for training in technology subjects are not adequate in secondary schools	3.41	3.84	0.81	0.58	3.72	0.68	Strongly Agree
	Subscale Mean & Standard Deviation	**2.83**	**2.92**	**1.06**	**0.61**	**2.88**	**0.58**	**Agree**

Table 2 shows that the respondents (technical teachers and administrators) agreed that there are inadequate standard workshop buildings available for technology subjects in secondary schools($\bar{x}_t$ = *3.14, SD_t = 0.60*), there are inadequate tools available for the teaching-learning of technology subjects in secondary schools ($\bar{x}_t$ = *3.56, SD_t = 0.64*), there is lack of equipment available for the teaching-learning of technology subjects in secondary schools ($\bar{x}_t$ = *3.32, SD_t = 0.61*), there is lack of health and safety facility for the teaching-learning of technology subjects in secondary schools ($\bar{x}_t$ = *3.19, SD_t = 0.69*), and there are inadequate machines for the teaching-learning of technology subjects in secondary schools ($\bar{x}_t$ = *3.72, SD_t = 0.68*). The respondents however disagreed that: modern facilities are available for the teaching-learning of technology subjects in secondary schools ($\bar{x}_t$ = *1.73, SD_t = 0.64*), Personnel for the maintenance of learning facility are readily available in secondary schools ($\bar{x}_t$ = *1.97, SD_t = 0.77*) and there is sustainable power supply for the learning of technology subjects in secondary schools ($\bar{x}_t$ = *2.44, SD_t = 0.65*). Therefore, the respondents agree that the inadequate standard workshop buildings/studios available, tools and machines; and the lack of equipment, health and safety facilities, modern facilities, maintenance personnel and sustainable power supply (Grand $\bar{x}_t$ = 2.88, SDt = 0.58) are the facility factors challenging the successful implementation of technology curriculum in secondary schools in Plateau State.

Hypothesis One

There is no significant difference between the mean responses of educational administrators and vocational and technical teachers on the teacher factors affecting the successful implementation of technology education curriculum in secondary schools.

Table 3

Summary Table of t-test for Comparison of mean of Technical Teachers and Administrators on the state of Teacher Factors for Successful Implementation of Technology education Curriculum (n_1 = 121, n_2 = 49)

Group	*N*	$\bar{x}$	*SD*	*t*		p.	Remarks
Teachers	121	25.39	1.88				
Administrators	49	25.43	1.48	0.124	168	0.911	NS

NS = *Not Significant,* $p > 0.05$, $df = 168$

Table 3 reveals that there is no significant difference between the mean responses of technical teachers and administrators on the teacher factors hindering the successful implementation of technology education curriculum, *t* (168) = 0.124, *p* = 0.911. This implies that the null hypothesis is accepted.

Hypothesis Two

There is no significant difference between the mean responses of educational administrators and vocational and technical teachers on the facilities factors affecting the successful implementation of the technology education curriculum in secondary schools.

Table 4

Summary Table of t-test for Comparison of mean of Technical Teachers and Administrators on the current status of Facility Factors for Successful Implementation of Technology education Curriculum (n_1 = 121, n_2 = 49)

Group	N	$\bar{x}$	*SD*	*t*	*df*	p.	Remarks
Teachers	121	26.36	1.58				
Administrators	49	26.26	1.47	0.362	168	0.718	NS

NS = *Not Significant,* $p > 0.05$, $df = 168$

Table 4 reveals that there is no significant difference between the mean responses of technical teachers and administrators on the facility factors associated with the effective implementation of technology education curriculum, *t* (168) = 0.362, *p* = 0.718. This implies that the null hypothesis is retained.

Discussion of Findings

Findings of the study revealed that the teacher factors hindering the effective implementation of technology education curriculum in secondary schools include inadequate professional technology teachers, lack of teacher motivation and inadequate supervision of trade subject teachers in secondary schools. Findings of the study revealed that teachers' inability to select suitable instructional strategies and absence of re-training of trade subject teachers are also hindering effective implementation of technology education curriculum. This Findings are in disagreement with that of Bandele and Faremi (2012) and Osam (2013) who posited that most trade subject teachers and instructors at the science and technical colleges are professionally qualified and moderately high for the teaching of trade subjects. However, the findings of the study is in line with that of Bandele and Faremi (2012) which revealed that in-service training and poor condition of service of teachers and instructors constitute some of the challenges facing the implementation of science and technical college curriculum. Most of the teachers saddled with the responsibilities of teaching technology education subjects in secondary schools are those not specifically trained for the job as obtainable in science and technical colleges. Technology education subject teachers ill-motivated and are not given proper and adequate up-to-date training for the successful implementation of secondary school technology education curriculum.

Findings of the study also revealed that lack of adequate workshop buildings, tools, and epileptic power supply are some of the facility factors hindering the effective implementation of technology education curriculum in secondary schools. These findings is in consonance with that of Lilly and Efajemue (2011) and Osam (2013) who posited that the poor state of infrastructure and inadequate facilities such as workshops, tools, machines and equipment are some of the challenges hindering the effective implementation of science and technical college programmes in Nigeria. Technology education curriculum can only thrive best when the necessary facilities are provided and always in good condition. The epileptic nature of power supply is seriously affecting the effective implementation of technology education curriculum most especially; as it relates to trade areas where machines needs to be powered for practical demonstration and students practical production exercises. Bandele and Faremi (2012) also noted that out-dated equipment and lack of standard workshop for the conduct of practical demonstration to students constitute the challenges facing the implementation of science and technical college programmes.

Conclusion

Based on the findings of this study, it is concluded that there is no adequate preparation and strategic plans put in place on the side of the government and education stakeholders for the effective and successful implementation of the current technology education curriculum in Plateau State. The implementation of the new Technology Education Curriculum began in 2014, about five (5) years ago. Yet, relevant and appropriate resources such as trained and experienced manpower and standard modern workshop buildings/studios, tools, and machines are grossly inadequate; modern equipment/facilities are also lacking. The lack or inadequate meeting of these factors is hindering secondary schools students' in plateau state the opportunity and access to learn technology subjects. Consequently, the preparation for a 21st century job-ready candidates, useful and self-reliant and technically innovative and creative members of the society will be denied. If this condition persists, it implies Plateau State will suffer the dearth of qualified, experienced and innovative technicians and engineers to man her infrastructure for economic benefits. The State and subsequently the nation will continue to experience rapid turn-over of high level youth unemployment rate and poverty at all levels with terrible socio-economic and political consequences on the society due to lack of or insufficient knowledge and skill gaps. If technology education is to achieve its national goals and objectives in the state, relevant stake holders must rise to the challenge to effect a change of attitude and commitment towards effective implementation of technology education curriculum for progress and prosperity of the state and the nation in general.

Recommendations

The following recommendations are made based on the findings of this study:

1. Education stakeholders must ensure effective planned supervision of technology education teachers and programmes to enhance efficiency.
2. Government and relevant education stakeholders should make plans to provide adequate modern workshop buildings, laboratories and studios; modern machines and tools for effective and efficient practical demonstrations/students' training and learning.

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EFFECTS OF BLOG AND MICROBLOG ON COLLEGE OF EDUCATION PRE-SERVICE TEACHERS' AGRICULTURAL SCIENCE LEARNING OUTCOMES IN LAGOS STATE

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ABSTRACT
This study investigated the effects of blog and microblog on College of Education pre-service teachers' agricultural science learning outcomes in Lagos State. The study adopted pre-test, post-test non randomized quash experimental designed. The population for the study was 229 agricultural science pre-service teacher in Lagos State Nigeria were used for the study. Intact class of 117 pre-service teacher year two (42 male and 75 female) in four schools were assigned to experimental group one, two, three and control group respectively. The research was guided by two research questions and two null hypotheses tested at 0.05 level of significant. The researchers used Blog, Facebook, WhatsApp Learning Platforms and Lecture method on Agricultural science concepts, which was used as treatment material for experimental group one, two and three while lecture method was used for control group. A pilot study was carried out to test reliability of the research instruments on 12 pre-service teacher year two from National Teachers Institution Kaduna, Lagos Branch. A reliability coefficient of 0.81 was obtained using the test-retest method on Agricultural Science Achievement Test (ASAT) and analysed used Pearson Product Moment Correlation. Thirty (30) multiple choice item questions were administered to both groups before and after the treatment as pre-test and post-test. The data collected was analysed using descriptive statistics (mean and standard deviation) to answer the research questions while inferential statistics (ANCOVA and ANOVA) statistics was used to test the hypotheses. The findings of the study revealed that there was significant difference in the mean achievement scores of Pre-Service teachers taught Agricultural Science concepts using Blog, Facebook and WhatsApp Platforms and Lecture Method. Also gender was not significant in the mean achievement of Blog Learning Platform group Based on the findings, the study recommends among others that Blog, Facebook WatsApp leaning platforms should be used for instructional delivery in the schools, so that students can learn, at their own pace, in order to improve students achievement.

Key Words: Blog Learning Platforms, Facebook Leaning Platforms, WatsApp Leaning Platforms and Achievement

Introduction

Technological advancement has greatly influenced the use of various media in teaching and learning especially in a social environment. One of the remarkable achievement of technology is communicating through social networks. Social networks are websites that enables an individual to connect with friends and families, share photos, videos, music and other personal information with either a selected group of friends or a wider group of people depending on the setting selected. King (2014) opined that technology has revolutionized the way humans communicate. A social networking service is an online service platform or site that focuses on facilitating the building of social networks or social relation among people who for example

share interest, activities, backgrounds and real-life connection (Effiong & Odey, 2013). Social networking which also referred to as social media encompasses many Internet based tools that makes it easier for people to listen, interact, engage and collaborate with each other. One major milestone in the history of the Internet has been the development of blogging and micro-blogging sites and these Internet connections are web-based. Tim Berners bee, the inventor of the worldwide web, sees it as place where people could share information through a series of hyperlinked pages. It is also a place where only technically skilled users would create content especially for information, entertainment and education purpose such as teaching and learning.
The effectiveness of teaching and learning largely depends on methods adopted and also educational tools used during teaching and learning process. There are many tools and networks that could be potentially used in academics for effective teaching and learning especially in higher education. Andy (2017) reviews the latest social media for academics and also provides the method on how to use them in teaching and learning process. These tools are academic.edu, Auto collage, cover it live, create space, crowd booster, Diaspora, Doodle, Drop box, Ever note, Explain everything, WhatsApp, Facebook, Google +, Google drive, Google scholar, Instagram, Liver stream, Moodle, my space, pad let, Tumblr, Twitter, YouTube, Weblog, among others. These academics social media tools can be used in teaching and learning process by creating or designing blogs and micro-blogs sites.

Blogs and Micro-blogs sites can be described as web journals. Blog content is unlimited while micro-blog is limited or short often to 140-200 characters per post. Ellison and Wu (2008) explained that a blog is an online diary with series of updates in chronological order, usually written in informal style in which students or teachers post an information or topics of interest in order to interact or communicate with each other. A blog site is a website that also allow students to post materials such as video or graphics, record opinion and information on regular basics, enter commentary, description of events that are designed to be used as online diaries collected chronologically without character limit. Its owner has the freedom to express his opinions about one or more topics. Blogs encourages students to write and read a topic they wish and make their comments.

Microblogging platform is one of the recent social media of web 2.0. It is a web-based platform that became one of the knowledge management scheme in the web 2.0 world. It allows the user to publish brief text, instant messaging, text message from all phones, e-mail, mp3 or the web information updates and exchange. Microblogging which is also known as Nano blogging enables its users to send and published short messages (about 140 characters) and is usually text and regular respond to questions. The updates are displayed on the users' profile page and are also immediately sent to other users who have chosen the option of receiving them.

Zhang (2010) explained that microblogging provides a light-weight and easy tool to post brief update about activities and support knowledge sharing and communication in academic setting. The user can restrict the sending of these messages only to members of the circles or friends or allowed its access to all users which is the default setting. Carmen (2017) argued that microblogging platform in education can be used by the students to send and receive message via the web, short message service, instant messaging among others. Microblogging platform specially designed for education is called cirip.ro, offers facilities such as live video, audio messages, multimedia objects embedding, private and public groups, deed monitoring.

In higher education, Facebook and WhatsApp platforms are used to make announcements, post assignment and remind students about important and latest information (Jeff, 2011). These platforms help students to upgrade, update, build good rapport, contact and engage themselves in learning. The platforms are easier and more direct way for students to communicate with fellow students, ask and answer questions on homework or assignments by posting the questions on a group chat when connected. Since students learn from others, having shared their learning experiences they gain a lot of insight and understand the topic faster. The examples of micro- blogging are Facebook.com, WhatsApp among others. The micro-blogging site such as Facebook and WhatsApp with their features can be used in teaching and learning since it encourages collaboration among teachers and leaners within the school especially in learning Agricultural Science concepts.

Agricultural science is one of the courses offered at colleges of education and it comprises of soil science, animal production, crop production, and genetics among others. Ben (2014) introduced Agricultural Science is practiced for the purpose of producing food and other human needs such as clothing, shelter, medicine, weapons, tools, and ornaments among others and is likewise practiced as a business for economic gain. He explained that Agricultural science which is farming practices includes the cultivation and tillage of soil, dairying, production, growing and harvesting of any agricultural and horticultural commodities, raising of livestock or poultry and any practices performed by a farmer on a farm. The relevance of Agricultural science to human existent made it natural course for National Commission for Colleges of Education (NCCE) to include it in college of education pre-service teachers' curriculum.

Pre-service teachers are trained in the college of education to be an agent of change, they prepared to be intellectually and professionally sound, capable of discharging their professional obligation to their students in the classroom after the successful completion of their training. Sheridan (2011) described Pre-service teachers as students that have been accepted into the teachers' education program, but yet to complete requirements for full certification as a teacher. He also described pre-service teachers as 21st century teachers who are all-knowing and questionable and the ones who are continually learning, self –aware and reflective.

The negligence to adopt the newest technology in teaching and learning process in Nigerian higher institutions is one of the causes of persistent poor performance of students in tertiary institutions. This poor performance can also be attributed to many factors which includes ineffective teaching method, unqualified and inexperienced teachers, and lack of effective use of social media among others.

Guoyuan (2018) reviewed that Educational Technology prepare Pre-service teachers to transfer knowledge and skill to their future classrooms. He also stated that Pre-service teacher's education should not only focus on how to use technology, but also how technology can be used for teaching and learning. Researchers have suggested that technology skills should be integrated throughout the teacher education curriculum in order to equip Pre-service teachers with the skills and experiences needed to apply technology to their various area of specialization. Thus the knowledge, skills, ideas and experiences that changes situation is gained through reading and studying for a specific period of time to bring out the best behaviour from the Pre-service teachers and also yield great profit and learning outcome.

Hubball and Burt (2007) described learning outcome as essential knowledge, attitudes and skills which a learner has achieved and can demonstrate at the end of a course or programme. Learning outcomes are the achievement of the learner and minimum performances that must be achieved to successful completion of a course or programme. In this study, learning outcome includes achievement.

Achievement has been defined differently by several scholars, but generally, achievement is the product of learning after one has been exposed to a particular treatment. Ndako (2017) defines Achievement as outcome that shows the extent to which a student, teaching or institution has achieved their educational goals.

Unfortunately, there have been gender disparities in pre-service teacher academic achievement in Lagos State. Kolawole (2007) found that male students achieved significantly better than female students in science education agricultural science in particular. Ilobeneke, Alabi, Falode & Kur (2018) who investigated the effectiveness of Facebook and WhatsApp supported instructional platforms on undergraduate students' achievement in educational technology. Findings revealed that significant difference exist in mean achievement of Facebook, WhatsApp and Lecture Method.

Gambari and Shittu, (2016) who investigated the effectiveness of blended learning and E-learning modes of instruction on the performance of undergraduates. Findings of the study showed that there was significant difference in the performance of the three groups in favour of Experimental group 1 (Blended learning).

Aicha (2014) who investigated the impact of using WhatsApp mobile learning activities on the achievement and attitudes of online students using mobile devices at the university. The results revealed that experimentation show that there are significant differences, at 0.05 alpha level, in the achievements and attitudes of the experimental group compared with the control group.

Isreal (2007) who investigated the effect of video-taped instruction in the teaching of history. The result of the ANCOVA statistical analysis revealed that gender was not a significant factor on students' achievement in history, when video-taped instructions are used.

In another development, Jimoh, Alabi, Falode & Olayiwola (2018) who investigated the effect of three modes of mobile instructional package on retention and gender of mathematics students in colleges of education, in North-Central Nigeria. The findings of the study revealed that there was no significant difference in the achievement and gender of mathematics student taught using Video Only, Audio+Text and Text Only.

Aim and Objectives of the Study

The aim of this study is to investigate the effects of blog and microblog on college of education pre-service teachers' agricultural science learning outcomes in Lagos State.
Specifically, the study sort to:

(1) Determine the effect of Blog, Facebook and WhatsApp Platforms and Lecture Method on Pre-Service Teacher's academic achievement using Agricultural science concept.
(2) Examine the influence of gender on Pre-service teacher's academic achievement in Agricultural Science concept using Blog Learning Platform.

Research Questions

The following research questions guided the study to:

1. What are the mean achievement scores of Pre-Service teachers taught Agricultural Science concept using Blog, Facebook and WhatsApp Learning Platforms and Lecture Method?
2. What are the mean achievement scores of male and female Pre-Service teachers taught Agricultural Science concept using Blog Learning Platform?

Research Hypotheses

The following hypotheses are formulated and to be tested at 0.05 level of significance.

HO$_1$: There is no significant difference in the mean achievement scores of Pre-Service teachers taught Agricultural Science concepts using Blog, Facebook and WhatsApp Platforms and Lecture Method.

HO$_2$: There is no significant difference in the mean achievement scores of male and female Pre-Service teachers taught Agricultural Science concept using Blog Learning Platform.

Methodology

The study adopted pre-test post-test randomized experimental research. The population of the study comprises all NCE pre-service teachers in Lagos State Nigeria and target population are NCE II Agricultural students. Intact class of 117 students (male =42, female=75) was used for the study from four purposively selected colleges of education based on the fact that the colleges are close to the researcher, the schools were purposively selected because Lagos state has seven colleges of education. A simple random sampling techniques was used to assign the four selected College of Education into the three experimental and one control group. Experimental group I was taught using Blog Learning Platform, Experimental group II was taught using Facebook Platform, Experimental group III was taught using WhatsApp Learning Platform while the Control group was taught using the Lecture Method. The Instruments for the study is Agricultural Science Achievement Test (ASAT) and treatment material were using Blog, Facebook WhatsApp Learning Platforms and Lecture method. The ASAT comprises of 30 multiple choice objective questions and Blog, Facebook WhatsApp Learning Platforms comprised of Agricultural lesson delivered by instructor on Blog, Facebook WhatsApp Learning Platform medium. The Agricultural Science Achievement Test (ASAT) and Blog, Facebook WhatsApp Learning Platforms were validated by three educational technology experts, the Agricultural Science Education experts and three lecturers from Agricultural Science Department College of Education, Lagos State. They determined the appropriateness of the package for teaching the chosen topics/units, clarity and simplicity of the package as well as its suitability for the level of the students, the extent to which the contents cover the topics/units they are meant to cover, possible errors in suggested answers and the structuring of the package. The test items and content of the package were corrected and modified on the basis of suggestions and recommendation of the experts. Experimental group and control were given Pretest before the treatment and after treatment posttest were administered on them. Mean and standard deviation were used to analyze the research questions while ANCOVA was used analyzed hypotheses. Conclusion it was established that there was significant difference in the mean achievement scores of Pre-Service teachers taught Agricultural Science concept using Blog, Facebook and WhatsApp Learning Platforms and Lecture Method. Also gender was not significant.

Results

Research Question One: What is the mean achievement scores of Pre-Service teachers taught Agricultural Science concept using Blog, Facebook and WhatsApp Learning Platforms and Lecture Method?

Table 4.1: Mean and Standard Deviation of Pretest and Posttest Scores of Experimental and Control Groups

Group	N	Pretest		Posttest		Mean Gain
		$\bar{X}$	SD	$\bar{X}$	SD	
Blog	32	28.40	8.00	73.82	11.94	45.42
Facebook	22	21.05	5.38	70.60	11.80	49.55

WhatSApp	33	25.87	5.96	60.90	7.13	35.03
LM	30	25.40	6.65	40.18	11.12	14.78

Table 4.1 shows the mean and standard deviation of achievement scores of experimental group one, experimental group two, experimental group three and control group in pretest and posttest. The result revealed that mean and standard deviation scores of the pretest and posttest experimental group one are $\bar{X}$ =28.40, SD = 8.00 and $\bar{X}$ = 73.82, SD = 11.94 respectively. This gives a mean gain of 45.42 for of Blog Learning Platforms group. Similarly, the mean and standard deviation of the pretest and posttest of the experimental group two are $\bar{X}$ = 21.05, SD= 5.38 and $\bar{X}$ = 70.60, SD = 11.80 respectively. This gives a mean gain of 49.55 for the Facebook Learning Platforms group. Similarly, the mean and standard deviation of the pretest and posttest of the experimental group three are $\bar{X}$= 25.87, SD= 5.96 and $\bar{X}$ = 60.99, SD = 7.13 respectively. This gives a mean gain of 35.03 for the WhatsApp Learning Platforms group. On the other hand, the mean and standard deviation of the pretest and posttest of the Lecture method are $\bar{X}$ = 25.40, SD = 6.65 and $\bar{X}$ =40.18, SD = 11.12 respectively and gives a mean score of 14.78for the Lecture method. The results revealed that experimental group one, two, three and control group had mean gain of 45.42, 49.55, 35.03 and 14.78 respectively with the experimental group one (Facebook Learning Platforms having the higher mean gain than Blog, which in turn has higher mean gain than WhatsApp Learning Platforms and Lecture method.

Research Question Two: What is the mean achievement and scores of male and female Pre-Service teachers taught Agricultural Science concept using Blog Learning Platform?

Table 4.2: Pretest and Posttest Scores of Male and Female Experimental Group Taught Agricultural Science using Blog Learning Platforms

Group	N	Pretest		Posttest		Mean Gain
		$\bar{X}$	SD	$\bar{X}$	SD	
Male	13	32.22	8.51	74.84	9.15	42.62
Female	19	25.78	6.65	73.12	13.72	47.34

Table 4.2 shows the mean and standard deviation of the pretest and posttest scores of male and female experimental group. From the result, it can be seen that mean score of the pretest and posttest score of the male are $\bar{X}$ = 32.22, SD = 8.51 and $\bar{X}$ = 74.84, SD = 9.15. The mean gain is 42.62 for the male. Similarly, the mean and standard deviation of pretest and posttest score of female are $\bar{X}$ = 25.78, SD = 6.65 and $\bar{X}$ = 73.12, SD = 13.72, the mean gain is 47.34 for the female. The female has slightly more gain score than the female

Research Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance:

Hypothesis One: HO_1: There is no significant difference in the mean achievement scores of Pre-Service teachers taught Agricultural Science concepts using Blog, Facebook and WhatsApp Platforms and Lecture Method.

Table 4.3a: ANCOVA Comparison of the Posttest Mean Scores of the Experimental Groups I (Blog), II (Facebook), III (WhatSApp) Learning Platforms and Lecture Method)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	20293.725[a]	4	5073.431	45.246	.000
Intercept	27220.999	1	27220.999	242.766	.000
PRETEST	8.093	1	8.093	.072	.789
GROUP	20171.790	3	6723.930	59.966	.000
Error	12558.417	112	112.129		
Total	467473.793	117			
Corrected Total	32852.142	116			

Table 4.3a shows the ANCOVA comparison of Posttest Scores of Blog, Facebook, WatSApp Learning Platforms and Lecture Method. An examination of Table 4.10a with F (3,112) = 59.966, p < 0.05, decision about hypothesis following the results of the analysis indicates that hypothesis one is rejected on the basis that the main effect (treatment) was significant. The results revealed that the Blog, Facebook, WhatsApp Learning Platforms and Lecture Method produced a significant effect on the posttest achievement scores of students when covariate effect (pretest) was controlled. The result indicates that the treatment, using Blog, Facebook, WatsApp Learning Platforms and Lecture Method accounted for the difference in the posttest achievement scores of the students. This implies that a statistical significant difference exists among the four groups of Blog, Facebook, WhatsApp and Lecture Method. Since it was established that there was a significant difference in the post-test scores of the groups, Sidak post-hoc test analysis was done to identify the direction of the difference among the treatment groups as shown in Table 4.4b.

Table 4.3b: Sidak Post-Hoc of achievement Experimental Group One, Two, Three and Control Group

	Group	Mean Diffence	Std Error	Sig	Lower bound	Upper bound
Blog	Facebk	2.922	3.132	.927	-5.466	11.309
	WhatsApp	12.812*	2.654	.000	5.704	19.921
	LM	33.493*	2.742	.000	26.149	40.837
Facebk	Blog	-2.922	3.132	.927	-11.309	5.466
	WatsApp	9.891*	3.002	.008	1.850	17.932
	LM	30.572*	3.027	.000	22.465	38.679
WatsApp	Blog	-12.812*	2.654	.000	-19.921	-5.704
	Facebk	-9.891*	3.002	.008	-17.932	-1.850
	LM	20.681*	2.675	.000	13.516	27.846
LM	Blog	-33.493*	2.742	.000	-40.837	-26.149
	Facebk	-30.572*	3.027	.000	-38.679	-22.465
	WhatsApp	-20.681*	2.675	.000	-27.846	-13.516

Table 4.3b shows the sidak post-hoc analysis of posttest mean achievement scores of students in experimental group one Blog Learning Platform, experimental group two Facebook Learning Platform and WhatsApp Learning Platform. The table indicates that significant difference exist between the mean scores of students in experimental group one Blog and experimental group two WhatsApp (Mean difference= 12.812). It also shows that significant difference exist between experimental group two Facebook and control group (Mean difference= 33.493). It also show significant difference between experimental group two Facebook and experimental group three WhatsApp (Mean difference = 9.891). Similarly, significant difference between

experimental group two Facebook and control group (LM) (Mean difference = 30.572). The implication of the analysis presented in the table 4.10b is that the use of Blog Learning Platform improve students' achievement towards Agricultural science better than Facebook Learning Platform. The use of Facebook Learning Platform can improve achievement than WhatsApp Learning Platform while the use of WhatsApp Learning Platform also improves students' achievement better than the use of Lecture Method.

Hypothesis Two: There is no significant difference in the mean achievement scores of male and female Pre-Service teachers taught Agricultural Science concept using Blog Learning Platform.

Table 4.4: ANCOVA Analysis of Achievement of Male and Female Students Scores Taught Agricultural Science Using Blog Instruction

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	102.451[a]	2	51.226	.344	.712
Intercept	11999.606	1	11999.606	80.567	.000
PRETEST	79.534	1	79.534	.534	.471
GENDER	63.461	1	63.461	.426	.519
Error	4319.244	29	148.939		
Total	178802.252	32			
Corrected Total	4421.695	31			

Table 4.4 shows the result of the hypothesis three. The hypothesis was tested using the pretest mean scores of male and female students taught using Blog Learning Platform as covariate for the analysis of Covariance. The F value of 0.426 was not significant at 0.05 alpha level that is F (1, 29) = .426, $p > 0.05$, decision about hypothesis following the result shows that there was no significant difference in the achievement of male and female students taught Agricultural Science using Blog Learning Platform. On this basis, the hypothesis three is retain. This shows that there was no statistical difference in the achievements of male and female students taught Agricultural science using Blog Learning Platform.

Discussion

There was significant difference in the mean achievement scores of Pre-Service teachers taught Agricultural Science concepts using Blog, Facebook and WhatsApp Platforms and Lecture Method. The study agree with the findings of Ilobeneke, Alabi, Falode & Kur. (2018) who investigated the effectiveness of Facebook and WhatsApp supported instructional platforms on undergraduate students' achievement in educational technology. Findings revealed that significant difference exist in mean achievement of Facebook, WhatsApp and Lecture Method. Also in support of Gambari and Shittu, (2016) who investigated the effectiveness of blended learning and E-learning modes of instruction on the performance of undergraduates. Findings of the study showed that there was significant difference in the performance of the three groups in favour of Experimental group 1 (Blended learning). The finding also in agreement the finding Aicha (2014) who investigated the impact of using WhatsApp mobile learning activities on the achievement and attitudes of online students using mobile devices at the university. The results revealed that experimentation show that there are significant differences, at 0.05 alpha level, in the achievements and attitudes of the experimental group compared with the control group.

There was no significant difference in the mean achievement scores of male and female Pre-Service teachers taught Agricultural Science concept using Blog Learning Platform. This is in agreement with the findings of Isreal (2007) who investigated the effect of video-taped instruction in the teaching of history. The study adopted the quasi-experimental research design using video-taped instruction and conventional strategies. The result of the ANCOVA statistical analysis revealed that gender was not a significant factor on students' achievement in history, when video-taped instructions are used. The study aligned with Jimoh, Alabi, Falode & Olayiwola (2018) who investigated the effect of three modes of mobile instructional package on retention and gender of mathematics students in colleges of education, in North-Central Nigeria. The findings of the study revealed that there was no significant difference in the achievement and gender of mathematics student taught using Video Only, Audio+Text and Text Only.

Conclusion

Based on the findings of the study, it was concluded that the use of Blog, Facebook and WhatsApp learning platforms for instructional delivery is effective for teaching and learning Agricultural science.

Blog, learning platform bridge achievement gap in both male and female students in Agricultural science

Recommendations

1. Blog, Facebook WhatsApp leaning platforms should be used for instructional delivery in the schools, so that students can learn, at their own pace, so that it will in turn improve students achievement.
2. Agricultural science students should be exposed to the use of Blog, Facebook WhatsApp learning platforms in order to improve their attitude towards learning the subject.

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PRE-SERVICE MATHEMATICS TEACHERS' PERSPECTIVE ABOUT LEARNING GEOMETRY USING VAN HIELE'S PHASE-BASED TEACHING STRATEGY: A CASE STUDY OF NIGER STATE COLLEGE OF EDUCATION, MINNA NIGERIA

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Abstract
The purpose of this study is to determine pre-service mathematics teachers' perspective about learning geometry using van Hiele's phase-based teaching strategy. A case study research design, an aspect of qualitative method was employed. Twelve pre-service mathematics teachers of Niger State college of Education, Minna form the sample of the study. Purposive sampling technique was employed base on achievement level that is, low, moderate and high achievers. Data were gathered by means of semi-structured interview protocol during 2017/2018 academic session. The information gathered from the interview conducted was recorded and manually transcribed, and then the data was organized and coded to come up with the emerging themes. Four strengths, three weaknesses and three corresponding suggestions to improve the weaknesses were identified after the interview. The findings therefore suggest despite the weaknesses observed, van Hiele's phase-based teaching strategy is found to be effective and therefore enhanced geometry achievement. This consequently resulted in changing pre-service mathematics teachers' negative impression about mathematics in general.

Keywords: Pre-Service mathematics teachers', perspective, van Hiele's phase-based teaching strategy

Introduction
The description of mathematics in general has been the focal point of researches over the last few years (Swars, Smith, Smith, Carothers, & Myers, 2018). Wasserman, Villanueva, and Mejia-Ramos (2018) put forward that there are several views about the ways in which learner and teachers perceived mathematics, which therefore determine the process of teaching and learning. In the same direction, Presmeg (2002) has responded that beliefs about the features of effective learning of mathematics on the other hand permit or restrict "the bridging process between everyday practices and school mathematics" (p. 295). Noraini (2005) however posit that effective teaching techniques for each segment of mathematics is different from each other. For instance, learning strategy that might be effective for statistics might not be effective strategy for probability. In view of this, Van Merriënboer and Kirschner (2018) affirmed that the strength and weakness of particular teaching method could be seen in area of teaching method employed. Consequently, Halat (2008) and Choi-Koh (2000) stressed that learning actions for geometry topics in particular is expected to stimulate learners through the use of van Hiele's phases of teaching strategy.

Van Hiele's model in particular, explains process of reasoning particularly in geometry, it comprises of five levels and five phases of instruction already applied in several research

(Abdullahi & Zakaria, 2013; Abu et al., 2012; Alex and Mammen 2016; Atebe, 2008; Cannizaro & Menghhni, 2006; Chang et al., 2007; Chew, 2007; Chew, & Lim, 2013; Erdogan & Durmus, 2009; Fuys et al., 1988; Hoffer, 1983; & Usiskin, 1982) associated to teaching and learning of geometry. In all of these researches, it was found out to be efficient in improving learners' performance. The model/theory was initiated and developed by two Dutch mathematicians in the 1950s, Pierre van Hiele and his wife Dina van Hiele-Geldof. According to Van Hiele (1986) the five levels according are: Recognition, Analysis, Order, Deduction and Rigor. The levels are arrived at as a result of experience and instruction rather than age. Hence, a learner is expected to have adequate knowledge of (classroom or otherwise) geometric thoughts to move to a sophisticated stage of difficulty. In order word, the characteristics of the model is hierarchical in nature. Respectively, the levels (levels 1 – 5) go together with by five phased-based teaching strategies. Chew (2009) and Choi-Koh (2000) established this by indicating that students has to pass over all the five phases to attain every of van Hiele's level. Accordingly, each and every level of geometric thought is arrived at as a result of sequence of the phases. The five phases of instruction are: Information, Guided orientation, Explicitation, Free-orientation and Integration.

Consequently, Choi-Koh (2000) and Chew (2009) affirmed that the field of activities organised in line with van Hiele's phases impacted positively on learner achievement in geometry. This therefore is seen as a welcome development in Nigeria context because topics on geometry constitutes 38% of the mathematics curriculum (Tsoho, 2011), and about 45% of total topics to be covered in the SSCE syllabus (WAEC, 2014).

Little studies have however investigated the issue of teacher's and learner's perspective on the strategy. Brooks, Dobbins, Scott, Rawlinson, and Norman (2014) in their research titled; "Learning about learning outcomes: the student perspective", employed students from three departments at the university of Leicester to form the focus group. A survey questionnaire was use as the instrument for the study to determine learners' perspectives and utilisation of learning outcome. The result however, revealed that generality of learners discovers learning outcome effective. At the same time, result further indicate that certain number of students, battled to comprehend the level of learning expected in their syllabus. Similarly, specific number of interviewees reported that learning outcome can limit their knowledge. While numerous learners, wanted learning outcome retained a focal point of their learning experience. It was therefore suggested that additional research is needed to come up with more efficient use of learning outcome as a learning resource. To this end, to come up with more efficient learning outcome, this study is expected to fill the gap as there is no research that specifically investigate the strength and weaknesses of a particular teaching stategy.

Chua, Tengah, Shahrill, and Leong (2017) in their research work on analysing students' perspectives on geometry learning from the combination of van Hiele phase-based instructions and GeoGebra, emphasized that opportunity should be given to learners to undergo efficient and fascinating learning technique taking advantage of modern technology, especially van Hiele theory, since learning activities in geometry are arranged accordingly. Thus, the main aim of the study was to identify learners' views on the activities formulated in accordance with the van Hiele's phases of learning geometry employing GSP software. Two teachers and 30 form two students form the sample of the study while questionnaire to gather information on students views on activities based on van Hiele's phases of learning geometry using GSP was the instrument used for the data collection. The result revealed that majority of the student agrees their geometry lessons was facilitated by the prepared activities and was however boosted their confidence in learning geometry. In addition, the GSP software was very easy in term of usage, which therefore assisted them in the process of learning.

Consequently, eliciting pre-service mathematics teachers' perspective about the strength and weaknesses of teaching strategy is crucial for assessing ways in which pre-service teacher programs might be organised with a view to best adjust future teachers with a particular teaching strategy required for their future teaching profession.

Aim and Objectives of the Study

The aim of this study is to elicit the pre-service mathematics teachers' perspective on the strengths, weaknesses of van Hiele's phase-based teaching strategy in Niger state, Nigeria. Specifically, the research objectives were as follows:

1. Ilicit the strengths, weaknesses of van Hiele's phase-based teaching strategy and suggestions to improve it from the pre-service mathematics teachers' perspective.

Research Questions

In an effort to elicit the pre-service mathematics teachers' perspective about geometry learning, the following research questions was raised:

1. What are the strengths, weaknesses of van Hiele's phase-based instructional strategy and suggestions to improve it from the pre-service mathematics teachers' perspective?

Methodology

In an attempt to address the research questions for this study case study research design, an aspect of qualitative method was employed. It was employed because it affords the enabling environment for the researcher to create an in-depth evaluation of social circumstances, happenings and interactions. (Mullen, 2005; Creswell 2007; Maxwell, 2004). According to Silverman, (2004), qualitative research is essentially concerned with explaining the manner of occurrence of certain experiences, how such experiences are understood by people concerned and the values which the people assign to them. In qualitative study, the researcher is mostly concerned in studying individual�början's or group‛s opinion of reality thus approximating the reality behind the story. By investigating multiple opinions, the qualitative researcher may describe the concerns and try to discover a unanimity amongst the voices heard (Thomas, 2010).

The population for this study was made up of all the 86 pre-service mathematics teachers in Niger state college of education Minna, Nigeria (College Department of Mathematics, 2017). The target population is year one (100 level) pre-service mathematics teachers who had registered MAT 122 (coordinate geometry) during 2017/2018 session.

The sample of this study consisted of 12 year one (100 level) pre-service mathematics teachers purposively selected from colleges of education Minna, Niger State, Nigeria. The reason for choosing 100 level pre-service mathematics teachers is because MAT 122 is a geometry course designed to prepare the pre-service mathematics teachers to teach geometry content based on basic education level constitutes part of the course to be studied at this level. The 12 pre-service mathematics teachers were purposively sampled base on achievement level that is, low, moderate and high achievers. The purposively sampled pre-service mathematics teachers (four pre-service mathematics teachers in each level) were consequently interviewed to elicit their views in respect of the strength, weaknesses and suggestions to improve the teaching strategy.

Interview protocol for eliciting pre-service mathematics teachers' perspective about van Hiele's phase-based teaching strategy was adapted from Sahar (2017) and was validated in terms of content validity by experts in the field of mathematics education from sampled college. The instrument gave room for interaction between the researcher and focus group at the end of the experiment.

The entire study lasted for 8 weeks. Shortly after administering the treatment and an achievement test, interview on pre-service mathematics teachers' perspectives on the strengths and weaknesses of van Hiele's phase-based teaching strategy was conducted. Analysis of the information gathered was done with a total of twelve pre-service teachers based on the emerging themes identified. Guest, Bounce, and Johnson (2006) and Creswell (2012) affirmed that 10, 20, 30, subjects might be engaged in an interview to permit theoretical saturation, and this will assist to minimizing the chance of creating theory based on insufficient data.

In analyzing the data, the information gathered from the interview conducted was recorded and manually transcribed, and then the data was organized and coded to come up with the emerging themes. The following method was employed thus:

Step 1. The documented data was transcribed and coded by means of highlighting and extracting pattern themes to create a pre-set (first) group of similarities. This is done to generate occurrences of the responses, persistent presence of items in each group question (pattern themes/similarities). The goal was to break the data and organize them in the next groups to ease comparison between responses (pattern themes/similarities) (Drake, Pytlarz & Patel, 2018).

Step 2. In this stage, all the initial extracted pattern themes in the first category are narrowed down in order to describe the participants‵concepts and beliefs as a sub-categorization; it is a verified or theoretical classification. This is more accurate in describing data, but closer to data category of the last stage of thematic classification. This stage trimmed the first group to be smaller and exact, as a theoretical or thematic strategy for concept reduction.

Step 3. This phase signifies the researcher's ideas as summary of extracted sub-themes/pattern themes, therefore it is more theoretical and the formation of themes that represent stage 1 and 2 of the qualitative data analyses (Bernard, Wutich, & Ryan, 2016).

Findings

The entire responses of pre-service mathematics teachers on the strength of van Hiele phase-based teaching strategy were centered on the fact that the teaching strategy is effective. Four strengths, three weaknesses and three corresponding suggestions to improve the weaknesses were identified. The strengths identified are: the teaching strategy motivated pre-service mathematics teachers to learn geometry, it is sequential in nature (step-by step), it is strategically planned in phases and the need of the learners are considered with the strategy. Contrary to this, overcrowded classroom, no adherence to time and lack of incorporation of technology into geometry class were identified as the weaknesses of the strategy.

It was in view of this that it was suggested that to improve the weaknesses identified, stand-by generator with equipped mathematics laboratory where all students will be going to learn geometry should be provided and used instead of relying on national grid. This will facilitate the understanding of geometry because, every student can see, touch and feel. Furthermore, technology should be in-cooperated into learning process to provide efficient and productive education in all regards, and also improve performance and encourage student's participation. Furthermore, moderate class size of about 20-25 students per class were recommended. Moderate class size of 20-25 in a class will assist the lecturer to have absolute control of the class and this will therefore enhance better understanding of the lesson taught. In addition to step by step implementation of the content taught, concrete object should be integrated to make it practically oriented.

In view of the abovementioned, despite the weaknesses observed, still the researcher concludes that van Hiele's phase-based teaching strategy is found to be effective and therefore enhanced geometry achievement. This consequently resulted in changing their negative impression about mathematics in general.

Conclusion/Recommendation

Based on the finding, it was concluded that Van Hiele's phases of learning geometry namely information, guided orientation, explicitation, free orientation and integration are a referable and implementable alternative learning strategy for geometry topics. Van Hiele's phases of learning make students' geometry activities more organised and systematic. Hence, the use of Van Hiele's phases of learning geometry is very much encouraged to be applied in learning geometry topics because there are many past studies that have proved that the use of those phases can give a positive impact to students such as increasing students' achievement in geometry, their understanding in geometry and level of confidence in mathematics in general.

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SURVEY OF LECTURERS' ATTITUDE, COMPETENCE AND UTILIZATION OF RESULT COMPILER SOFTWARE (RCS) IN FEDERAL UNIVERSITY OF KASHERE, GOMBE STATE, NIGERIA

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Abstract
This study investigated lecturers' attitude, competence and utilization of result compiler software (RCS) in Federal University of Kashere Gombe State, Nigeria. The study adopted a descriptive survey method. One hundred and eighty-seven lecturers were sampled in the university using stratified sampling procedure. The instrument used for the study was a questionnaire titled Lecturers Attitude toward Result Compiler Software (LARCS) and was subjected to reliability check. A Cronbach alpha was computed to ascertain the internal consistency of the instrument as .86, .79 and .76 were obtained on the three variables (attitude, competence and utilization) for the study. Based on the theoretical framework of the study, three research questions and a null hypothesis were generated, answered and tested using descriptive and inferential statistics. The findings of the study showed that lecturers have positive attitude toward result compiler software (RCS), lecturers are competent in the use of result compiler software (RCS) to some extent and have high level of utilization of result compiler software (RCS). Similarly, there is a statistically significant difference in the attitude of younger and older lecturers toward result compiler software (RCS) in favour of younger lecturers. Based on these findings, it was recommended among others that the university management should continue to motivate lecturers to sustained their attitude toward result compiler software and organize routine training in the area of result compilation.

Key words: Lecturers, Attitude, Competence, Utilization, Result Compilation Software.

Introduction

The demand for higher education in Nigeria is growing exponentially, and this have increased lecturer-student's ratio in the universities, thus making students assessment, result compilation and report cumbersome especially for less technology savvy lecturers who do not possess the required skills to use any form of technology. The increasing demands had pushed university managements to introduce the use of result compiler software in order to reduce the complex nature of manual result compilation and timely preparation of result for consideration and approval (Ukem & Ofoegbu, 2012). To fulfil this pressing demand, lecturers are challenged to use result compiler software to prepare students result as a component of their role of teaching in the 21st century. Supporting the introduction of computer software to process students result, Francis (2012) was of the view that the use of computer technologies and related software to electronically compile and compute students' results is an important milestone in the overall innovative practices in education, attempting to overcome some limitations that are experienced in the conventional manual result compilation. Recent advances in computer and relevant software have saved university lecturers time, energy and repetitive mistakes emanating from traditional manual computation of students' results to electronic system in which student scores are uploaded electronically (Obayi, 2013). Ukem and Ofoegbu (2012) added that using computer result compiler software (RCS) has minimized the problems of missing results, unnecessary delays and deliberate manipulation of grades during computation.

It is interesting to note that result compiler software works harmoniously with a computer system which was traditionally known to reads, stores, perform calculations and display data. Surprisingly, the same machine can be programmed to compute students' results using internet-based result compiler software (RCS). A compiler is a computer program that transforms source code written in a programming language (*source language*), into another computer language (*target language)* often having a binary form known as object code or machine code. Francis (2012) opined that result compilation encompasses the effective use of equipment and programmes to upload, convert, organize, save, and present processed students results including a button for printing students' transcript. Transcript is an official copy of students' academic record, showing courses taken and grades obtained detailing students complete records at the university (Hsu, Wang, & Chiu, 2016). According to Obayi, (2013) the use of result compiler software in the 21st century have become necessary to compute and keep students' records and also to enable administrative staff to process and retrieve students' academic transcript within few days of request. In addition, Muzenda, (2013) remarked that result compiler software is embedded with data security which ensure that the database is protected from corruption and access by unauthorized persons. Thus, data security helps to ensure privacy and can be safeguarded through encryption, user authentication, and backup solutions. Student result stored in computer software can be positioned in a way that only authorized person(s) can access it.

Universities and other tertiary education institutions have long been using result compiler software to compute students result and store students' academic records for future use. Federal University of Kashere, being a Federal government of Nigeria owned University established in 2011 to ensure equity and access to tertiary education in the country is in the forefront in the introduction and use of result compiler software since inception. Building on its peculiarities and earnest need of the community, the University is conventional with four undergraduate faculties and each faculty is made up of departments with interrelated scope and study disciplines. The faculties are Agriculture, Education, Science, Humanities and Social sciences (FUK, 2016). The university uses result compiler software, a web based software for uploading, computing and storing students' results. The software process students result accurately following the set operational guidelines by the programmers; Uploading students' courses for students' access during registration by the head of department, registration of courses by the students using students interface, approval by the level adviser, head of department and the academic secretary. For lecturers to be assign duty as course lecturers by the head of department, they should register with ICT unit using their staff identification number. Similarly, during result compilation, all course lecturers are required to download the list of registered students and enter the scores for continue assessment (C. A) and examination and upload, compilation of results by the department examination officer follows (FlexiSAF, 2018).

Considering the years under which lecturers compiled student results in the university, the process had witness some noticeable challenges ranging from access to university portal, poor internet service, poor knowledge of the working environment, Hsu, Wang, & Chiu, (2016) added competency in the use of computer and attitude toward the use of computer and related software and above all, electricity failure. With the aforementioned challenges, there is every possibility that the enthusiasm earlier developed for using the software may reduce and this had inspired the researchers to investigate the level of lecturers' attitude and competence in the utilization of result compiler software in Federal University of Kashere.

Attitude are ways that people think, feel and behave towards somebody or something. Attitude according to Francis, (2012) is the belief of lecturers about computer which, positively or negatively influence their behavior towards its use. Hsu, Wang, and Chiu, (2016) opined that attitudes are predispositions meant to respond in a particular way toward a specific class of objects. Thus, objects in this context may include those that are both functional and non-functional. Due to the fact that attitudes are predispositions, they are not directly observable and neither can they be measured by assigning numerical value. However, inferences can be drawn from the way an individual respond or react to stimuli in order to determine what the attitude of that person is to a given phenomenon.

To successfully implement the use of result compiler software in the university, Francis, (2012) argued that lecturers' support through positive attitudes is necessary. Supporting this view, Agbetuyi and Oluwatayo (2012) added that if lecturers perceived the use of any form of technology programmes as neither fulfilling their needs nor their students' needs, it is likely that they will not integrate the technology into their teaching and learning. Conversely, if lecturers' attitudes are positive toward the use of that technology, they can easily provide useful insight toward its adoption and integration into teaching and learning processes. Francis, (2012) remarked that positive attitude provides a platform for skill development and competency which are both necessary for result computation.

Muzenda, (2013) described competence as the ability of a person to perform an acquired skill or use an inherent behavior to manipulate a machine, an object, for a particular purpose. Competence is synonymous to ability while ability to perform relies very much on the acquired skill of the competent individual as the case may be. Gay, (2010) referred to competency as the mastery of a relevant body, scope and field of knowledge, coupled with high-level skill in applying that knowledge to affect specified learning outcomes. Computer competence according to Muzenda, (2013) is the ability of a lecturer to perform basic computer operations, use generic software and integration of computer to instruction, based on lecturers' self-efficacy. In view of this, the issue of use of computer and related software by lecturers depends solely on their level of competence in terms of the skill acquired.

For a lecturer to achieved the level of competency in the use of computer and generic software, the knowledge and skills previously acquired should be put to use for effective result compilation. Similarly, Hsu, Wang, and Chiu, (2016) remarked that tertiary institution lecturers' frequency in the use of generic software is demonstrated by their attitude toward its usefulness. Thus, Davis, (1986) proposed that attitudes are a function of beliefs, and those beliefs lead to behavioural intentions leading to acceptance or otherwise of a certain form of technology. If the intention is not changed, by some external factors, it will lead to specific behaviour. Building on Technology Acceptance Model (TAM) which postulates that the use of information system is determined by the behavioural intention, but on the other hand, that behavioural intention is determined by the person's attitude toward the use of the system and also by his perception of its utility. According to Davis, the attitude of an individual is not the only factor that determines the use of a system, but is also based on the impact which it may have on the individual performance. Davis (1993) viewed computer usage as being extrinsically motivated by gains in performance and associated rewards and that individual who has a strong sense of capability in dealing with computers is more likely to accept new technology.

A comprehensive review of related literature in the domain of result compiler software and learning management system utilization revealed conflicting results. For example, a study by Leidner, and Jarvenpaa, (2013) showed that the variables that influenced the effectiveness of result compiler environment are technology, teaching and lecturers attitudes. Muzenda, (2013) conducted a study on lecturer competency in the use computer software in examining and computing students result. The result revealed that lecturers are competent in the use of computer software for result computations. Volery, and Lord, (2012) also stated that in the analysis of 47 students whose result were compiled based on e-learning software found that lecturers demonstrated expertise in three critical success factors (CSFs) in e-learning software environment; technology (easy to access, navigation, interface design and level of interaction), instructors (instructor attitudes towards the compiler software, instructors technology competencies and interaction during the classroom) and lecturers prior experience in the usage of technology.

Another study based on critical success factors of the use of e-learning by Hsu, Wang, and Chiu, (2016) concluded that factors influencing the use of e-learning software environment by lecturers involves human factors (motivation skills, time and effort), instructor technical competency, constructivist thinking by the instructors, high level collaboration and user-friendly. Papastergiou, (2010) investigated lecturer's competence and attitude towards Information and Communication Technology. Findings revealed that majority of lecturers have a positive attitude towards the use of ICT, and they are competent in the use of few basic tools. Overall, a significant difference was established between younger and older lecturers attitude toward use of ICT. Hence, it is important to conduct research regarding lecturers attitude, competence and level of utilization of result compiler software (RCS) among faculty members in Federal University of Kashere Gombe State, Nigeria.

Statement of the Problem

Despite the fact that result compilation is intellectually demanding, rigorous, complex work and time consuming, too often delays in uploading students' scores by course lecturers and compilation by examination officers abound which renders most results incomplete for consideration and approval by senate. Consequently, poorly uploaded scores by course lecturers caused additional workload on the side of examination officers for manually editing these scores for further compilation. These anomalies are attributed to lecturer's attitude toward result compiler usage, their competence and perceived usefulness. It is against this background that the researchers consider it appropriate to assess the variable that did not fit well among lecturers as regards their attitude, competence and utilization of result compiler software (RCS) in Federal University of Kashere.

Purpose of the Study

The purpose of this study is to assess the lecturers' attitude, competence and utilization of result compiler software (RCS) in Federal University of Kashere, Gombe state, Nigeria. Specifically, the study was carried out to achieve the following objectives:

1. To determine whether lecturers have positive or negative attitude toward using result compiler software (RCS).
2. To assess lecturers level of competency in the use of result compiler software (RCS).
3. To assess lecturers level of utilization of result compiler software (RCS).
4. To find out the difference between younger and older lectures attitude toward result compiler software (RCS)?

Research Question

1. Do lecturers have positive or negative attitude toward using result compiler software (RCS)?
2. What is the level of lecturers' competency in using result compiler software (RCS)?
3. To what extent do lecturers use result compiler software (RCS)?
4. What is the difference between younger and older lectures attitude toward result compiler software (RCS)?

Research Hypotheses

A null hypothesis was formulated and tested at $p \leq 0.05$

H_1: There is no significant difference between younger and older lecturers' attitude toward result compiler software (RCS) in Federal University of Kashere, Gombe State.

Methodology

The study adopted a descriptive survey research design. Descriptive survey was considered appropriate for this study as it seeks to ascertain the opinions of respondents on the extent of Lecturers attitude, competence and utilization of RCS in Federal University of Kashere. The population of this study comprised of all the 487 lecturers in Federal University of Kashere. One hundred and eighty-seven lecturers were selected from four faculties (Agriculture, Education, Science, Humanities and Social Sciences) in the university using stratified random sampling. The instrument titled Lecturers Attitude toward Result Compiler Software (LARCS) was developed by the researchers and used for data collection. The questionnaire elicited data from the respondents on the extent of lecturer's attitude, competence and utilization of Result Compiler Software (RCS). The questionnaire was patterned in to five point likert-scale as 5- Strongly Agree (SA), 4- Agree (A), 3- Neutral (N), 2- Disagree (D), and 1- Strongly Disagree (SD).

The instrument was validated by two computer scientists, three educational technology experts and one specialist in measurement and evaluation. The relevance, phrasing and suitability of the items of LARCS and how friendly the instrument is at the face level were all put together as the criteria used for the instrument validation. The instrument was administered to twenty lecturers in Gombe State University and the result was computed using Cronbach alpha to ascertain the internal consistency of the instrument as .86, .79 and .76 on the three variables (attitude, competence and utilization) of the study.

The data of the study was analysed using descriptive and inferential statistics. First, descriptive statistics was conducted using Shapiro-Wilk test to test normality of the data for it to qualify for parametric tests. The test results for normality of the data before computing means and standard deviations does not result into significant levels (attitude = .074, competence = .576 and utilization = .270) thereby violating the normality assumptions and assumed distribution to be sufficiently normal to qualify the data for a parametric test, (Pallant, 2010). Research questions was answered using means with arithmetic mean for the values computed as 5+4+3+2+1= 15/5 = 3.00. Therefore, any item with weighted mean of 3.00 was considered accepted and any item with weighted mean less than 3.00 was considered rejected as a decision rule. While t-test was used to test the null hypotheses at 0.05 level of significance using SPSS version 20.0.

Results and Demographics

Figure 1. Shows the graphical illustration of lecturers age

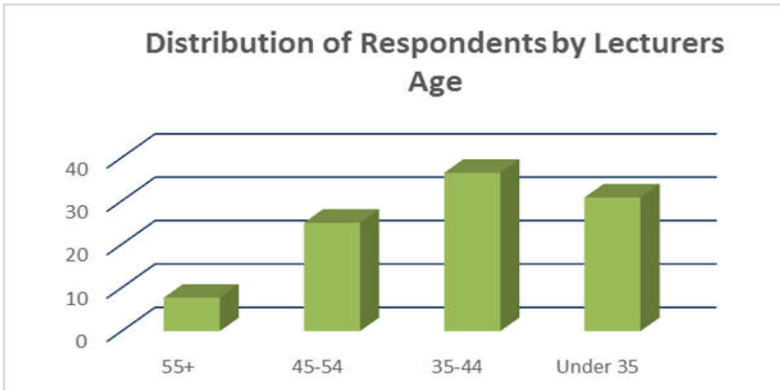

Figure 1: Shows the distribution of lecturers age in Federal University Kashere and the analysis indicates that majority of lecturers' age fall between (35-44) years with 36.5%, followed by under 35 years with 30.8% and (45-54) years with 25.0% while those with 55+ years are 7.7%. This implies that majority of the workforce lies within the range of (35-44) years in the University and these age range are assumed to be technology savvy.

Figure 2: Shows the graphical illustration of lecturers by educational qualification

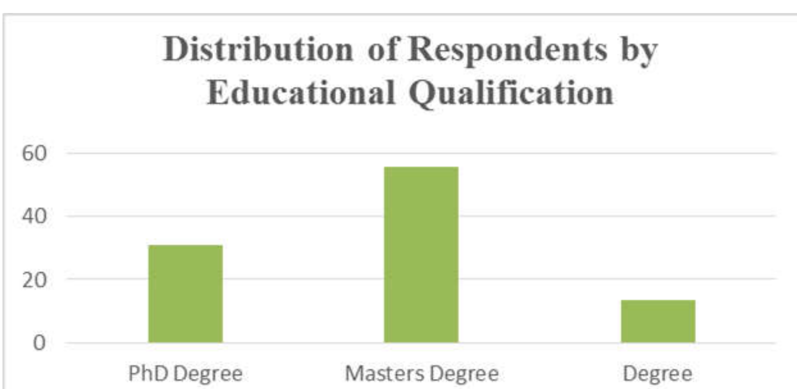

Figure 2: shows the distribution of lecturers by educational qualification in Federal University Kashere. The analysis showed that majority of lecturers obtained a master's degree qualification with 55.7%, followed by PhD. Degree with 30.8% while those lecturers with degree had the least with only 13.5%. This implies that majority of lecturers whose age range lies between (35-44) years obtained a master's degree qualification and have been anticipated to have been competent in the use of technology.

Figure 3: Shows the graphical illustration of lecturers by years of experience

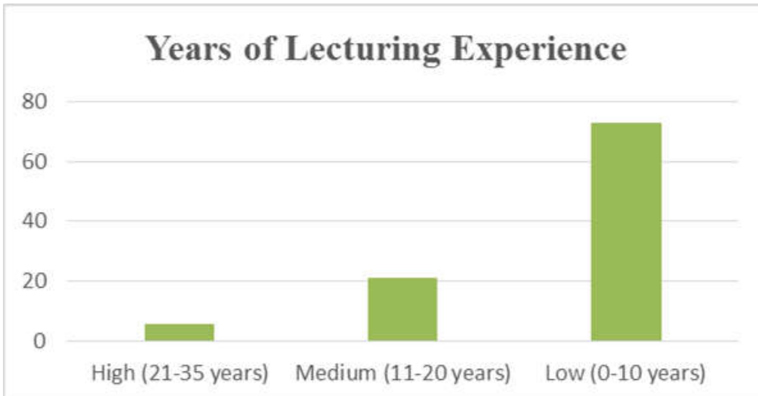

Figure 3: shows the distribution of lecturers by years of experience in lecturing. The analysis shows that majority of lecturers are those that spend below 10 years in lecturing service with 73.0%, followed by 11-20 years with 21.2% while the least are those lecturers with 21-35 years in lecturing experience with least percent of 13.5%. This implies that majority of lecturers in Federal University Kashere spent 0-10 years of experience in lecturing. The demographics appears to have been in agreement with its components parts. For instance, lecturers whose age range lies between (35-44) years were found to have obtained a master's degree qualification with minimum of 10 years in lecturing service.

Research Question one: Do lecturers have positive or negative attitude toward using result compiler software (RCS) in Federal University Kashere Gombe State?

Table 1: Mean Attitude Response of Lecturers toward Using Result Compiler Software (RCS) in Federal University Kashere, Gombe State.

S/N	ITEMS	Mean	SD	Decision
1	I enjoy working with result compiler software	3.81	.841	Positive
2	I would work harder if I could use result compiler software more often	3.73	1.140	Positive
3	I think that it takes a long time to finish when I use a result compiler software	2.46	1.038	Negative
4	I feel comfortable working with a result compiler software	3.92	.882	Positive
5	I believe that as a lecturer it is very important for me to learn how to use a result compiler software	4.56	.574	Positive
6	Working with a result compiler software and computers makes me nervous	2.25	1.100	Negative

7	Using a result compiler software is very frustrating especially if the internet signals is weak	3.56	1.259	Positive
8	I will do as little work with result compiler software as possible	2.88	.922	Negative
9	I can do more from manual result compilation than from a result compiler software	2.63	1.329	Negative
10	I cannot think of any way that I will use computers in my career	2.00	1.048	Negative
11	I believe using result compiler software in the faculties will make the educational process easier and more enjoyable	4.21	.871	Positive
12	I think that using result compiler software will help arrive at accurate result computation	4.19	.841	Positive
13	I use a computer to manage and manipulate digital text	3.83	.901	Positive
14	I use the web to download applications, audio, graphics, pictures and video files from the Internet	3.73	1.069	Positive
15	I use the web to look up reference information for study purposes	4.21	.750	Positive
16	I use the web to send or receive email	4.29	.936	Positive
	Average Mean	**3.51**		

Decisions Mean= 3.00

Table 1 reveals the mean attitude responses of lecturers toward using result compiler software (RCS) in Federal University of Kashere. A total of 187 lecturers responded to 16 items in the questionnaire and the result showed that the respondents agree with item 1, 2, 4, 5, 7, 11, 12, 13, 14, 15 and 16 but disagreed with items 3, 6, 8, 9 and 10 with an average mean of 3.51 to the 16 items. This indicates that lecturers have positive attitude toward using result compiler software (RCS) in Federal University of Kashere.

Research Question two: What is the level of lecturers' competency in using result compiler software (RCS) in Federal University Kashere Gombe State?

Table 2: Mean Responses of Lecturers Level of Competence in the Use of Result Compiler Software (RCS) in Federal University Kashere, Gombe State.

S/N	Items	Mean	SD	Decision
1	I feel I am not capable of using result compiler software	1.88	1.003	Disagree
2	I need training to understand how to use result compiler software	3.29	1.177	Agree
3	I believe that frequent use of result compiler software will increase my ability to record, upload, compile and store and retrieve students result	4.35	.623	Agree
4	I think it is not easy to access the wireless network to connect to the university portal	3.67	1.098	Agree
5	I believe that using result compiler software is a complicated process	2.40	1.071	Disagree
6	I think it would be easy for me to become skilful at using result compiler software	4.00	.767	Agree

7	I think I can collaborate with other lecturers in my faculty to learn how to access and use the portal.	3.81	.908	Agree
8	Knowing how to use computers and result compiler software is a worthwhile skill any lecturer should lean	4.29	.667	Agree
9	I think without result compiler software, lecturers and examination officers would not find it easy to make result available to students in good time	3.60	1.272	Agree
10	I think lecturers and examination officers need prompt and effective technical support to be competent in using the result compiler software.	4.13	.715	Agree
11	I think university management has to provide the skilled manpower to manage and trouble shoot the result compiler software.	4.17	.810	Agree
12	I think academic staff needs to collaborate with colleagues elsewhere to develop their competency in using internet based software.	4.37	.658	Agree
	Average Mean	**3.66**		

Decisions Mean= 3.00

Table 2 reveals the mean rating responses of lecturers' level of competency in the use of Result Compiler Software (RCS) in Federal University Kashere. The result showed that respondents are in agreement with all the items except item 1 and 5. The average mean of all the items is 3.66, which is above 3.00 and the range of standard deviation is between .62 and 1.00 which implies that lecturers were non-divergent in their responses. It further indicates that lecturers are competent in the use of result compiler software (RCS) in Federal University of Kashere.

Research Question three: To what extent do lecturers use result compiler software (RCS) in Federal University Kashere, Gombe State?

Table 3: Mean Responses of Lecturers level of Utilization of Result Compiler Software (RCS) in Federal University Kashere, Gombe State.

S/N	Items	Mean	SD	Decision
1	The result compiler software is user-friendly	3.73	.888	Agree
2	I like to use a result compiler software for uploading continue assessments and examination scores	4.00	.626	Agree
3	I wish I would not have to use a result compiler software as part of my lecturing job	2.56	1.211	Disagree
4	I think it might take me awhile to get comfortable with using result compiler software	2.63	.971	Disagree
5	I would like to use the result compiler software as an alternative to manual result compilation	3.90	.913	Agree
6	I would like to use the manual result compilation instead of result compiler software	2.31	1.094	Disagree

7	I would like to use email to ask questions regarding how and where to enter the scores	3.08	.987	Agree
8	I would like to use the result compiler software for distance result upload and compilation from home	4.12	.732	Agree
	Average Mean	**3.29**		

Decisions Mean= 3.00

Table 3 showed the mean responses of lecturers use of result compiler software (RCS) in Federal University of Kashere. The result reveals that respondent agreed with item 1, 2, 5, 7 and 8 but disagreed with item 3, 4 and 6 with an average mean of 3.29 to the eight items. This indicates that lecturers are utilizing result compiler software (RCS) to some extent in the University.

Hypothesis one: There is no significant difference between younger and older lecturers attitude toward result compiler software (RCS) in Federal University of Kashere. To test this hypothesis, a t-test analysis was conducted to compare the differences in the attitude of younger and older lecturers toward result compiler software (RCS) in Federal University of Kashere.

Table 4: Summary of t-test Result of the Mean Rating Responses of Younger and Older Lecturers Attitude toward Result Compiler Software (RCS) in Federal University of Kashere.

Variable	N	df	Mean (χ)	SD	t- value	p-value
Younger Lec.	112		55.04	8.772		
		185			15.157*	.000
Older Lec.	75		31.91	12.094		

S: Significant at 0.05

The T-test result in table 4 indicated that there is a statistically significant difference in the attitude of younger and older lecturers toward result compiler software (RCS) in Federal University of Kashere (t=15.157, df = 185, P. 0.000) in favour of younger lecturers. Further, *Cohen's d* value of (d= 2.18) indicated this was a *large* effect size difference between the younger and older lecturers. Therefore, the null hypothesis is rejected. This implies that younger lecturers manifest a more positive attitude toward result compiler software than the older lecturers in Federal University of Kashere.

Discussion of findings

This study assessed lecturers' attitude, competence and level of utilization of result compiler software (RCS) in Federal University of Kashere. Figure 1 reported the demographic profile of the respondents which shows that majority of lecturers age lies between (35-44) years and Figure 2 indicated that this category of lecturers obtained a master's degree qualification while Figure 3 also indicated that majority of lecturers in the university are those that spend below 10 years in lecturing service. These demographics have drawn a roadmap to the outcome of this study because of its consistency with components parts. For instance, lecturers whose age range lies between (35-44) years were found to have obtained a master's degree qualification and had a minimum of 10 years in lecturing service.

The finding of research question one revealed that lecturers in federal university of kashere have positive attitude toward result compiler software (RCS). An important point emanating from this finding showed that even those lecturers (especially leveladvisers) who choose not to be technology compliant believed that the result compiler software has considerable potential to make their work less cumbersome. This findings is not surprising considering the result of the demography which revealed that majority of lecturers age lies within the range of (35-44) years which undoubtedly shaped their attitude toward accepting to use the technology. Thus, further confirming the proposition of technology acceptance model which states that the use of information system is determined by the behavioural intention, and that behavioural intention is determined by the person's attitude toward the use of the system. The finding is in agreement with the earlier finding of Leidner, and Jarvenpaa, (2013) whose result showed that the three main variables that influenced the effectiveness of result compiler environment are technology, teaching and lecturers attitudes.

The finding of research question two revealed that lecturers are competent in the use of result compiler software (RCS). It is worth noting that younger lecturers are more technology savvy and more comfortable in using technology than the older academics. The finding is consistent with Muzenda, (2013) whose result revealed that lecturers are competent in the use of computer software for result computations. The result is also in agreement with the finding of Volery, and Lord, (2012) whose result found that lecturers demonstrated expertise in three critical success factors (CSFs) in e-learning software environment; technology (easy to access, navigation, interface design and level of interaction), instructors (instructor attitudes towards the compiler software, instructors' technology competencies and interaction during the classroom) and lecturers prior experience in the usage of technology.

The finding of research question three revealed that lecturers utilize result compiler software (RCS) in the University. This finding is not astounding considering the lecturers age, academic qualification and the minimum years they have in active service. The finding agrees with the earlier finding of Hsu, Wang, & Chiu, (2016) who concluded that factors influencing the use of e-learning software environment by lecturers involves human factors (motivation skills, time and effort), instructor technical competency, constructivist thinking by the instructors and Obayi, (2013) added high level collaboration and user-friendly.

The finding on hypothesis 1 revealed that there is a statistically significant difference in the attitude of younger and older lecturers toward result compiler software (RCS) in Federal University of Kashere in favour of younger lecturers with large effect size. The finding is supported by the earlier finding of Papastergiou, (2010) whose result revealed that majority of lecturers have a positive attitude towards the use of ICT, and they are competent in the use of few basic tools. Overall, a significant difference was established between younger and older lecturers' attitude toward use of ICT.

Conclusion

Based on the findings of this study, it was concluded that:

1. Lecturers age range fall between 35-44 years with highest number of them having master's degree and 0-10 years of lecturing experience in the University.
2. Lecturers in Federal University Kashere have positive attitude toward result compiler software (RCS).
3. Lecturers are competent in the use of result compiler software (RCS) in Federal University Kashere.

4. Lecturers utilize result compiler software (RCS) to some extent in Federal University Kashere.
5. There is a statistically significant difference in the attitude of younger and older lecturers toward result compiler software (RCS) in Federal University of Kashere in favour of younger lecturers.

Recommendations

Based on these findings, the following recommendations were made:

1. The university management should use all avenues available to train young and older lectures in good time so as to increase the manpower strength in the university.
2. The management of Federal University Kashere should continue to motivate lecturers to sustain their attitude toward result compiler software and help them to constantly update their knowledge about global issues especially in the area of information and communication technology, specifically in result compiler software (RCS).
3. Competency in using result compiler software (RCS) is an issue that requires constant practice and access to necessary tools, therefore, the university management should mandate the deanery to constantly organize seminars and workshops both at department and faculty level especially in the area of information and communication technology. This is necessary to update their knowledge of computer usage for various tasks ahead.
4. The management of Federal University Kashere should initiate a process for equipping lecturers with laptop computers, tablets and related hardware (even on soft loan basis) to increase access and ownership which is a precursor to technology and software utilization and expertise.

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ENHANCEMENT OF TERTIARY INSTITUTIONAL WORKSHOP AND PRACTICES AS A STRATEGY FOR INCREASING INNOVATIONS IN TECHNOLOGY EDUCATION

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Abstract
To foster innovation substantially in technology education, there is the need to improve tertiary institutional workshops as well as reform the pattern of workshop practices among students in the area. This work therefore describe enhancing of workshop and practices among students as a strategy for increasing innovation in technology education. Using relevant literature, this paper addresses areas such as; conceptual definitions in relations to technology education, workshop practices in Nigeria institutions, present state and challenges of technology education practical workshops in Nigeria, the need for the improvement of technology education workshops and practices, developmental strategies for the improvement of technology education practical workshops and practices. It then concluded that enhancing workshop and practices in tertiary institutions will allow student to put their creative thoughts into actions, create more rooms for teamwork, facilitate good students and lecturers/instructors relationship as the lecturer/instructor will as such be able to understand better the student conception and develop plans on to build on them thereby increasing innovation in technology education as new ideas will find their own ground into practices as well as existence.

Keywords: Enhancement, Tertiary Institutional Workshops, Practices among Students, Innovation, Technology Education

Introduction

Innovative development of any nation depends strongly on the strategies it continues to lay down for itself, as this strategies will have short and long time effect on it economy and should be open and subjected to review. Uwaifo (2001) stated that vocational and technical education is aimed at developing not only practical skills but also attitudes and habits that make the recipient a creative, innovative and resourceful person.

Dike (2005), asserts that vocational education and training prepares learners for careers that are based in manual or practical activities, traditionally non-academic and totally related to a specific trade, occupation or vocation. As such it becomes very clear that technology education in Nigeria is not assuming it full potentials.

Walmsley in Maeko and Makgato (2014) quoted Fritz to have put forward that the traditional pedagogy of workshop-type technical subjects was, and still is, in many cases, 'demonstration and follow' ; he said it has been used to good effect in the development of student competencies, particularly in industrial skills. However, technology education's evolution is transforming the subject from one that requires learners to imitate teacher-prescribed industrial hand- and machine-skills to one that is argued as being unique in the school curriculum. Technology education has been developed as a subject aimed at promoting an individual learner's ability to solve real-world problems by integrating specifically relevant knowledge of structures, materials, technological processes and systems.

The world presently has witness a lot of innovative development, this development covers almost every sector, some of which include areas such as; automotive, building/construction, electrical/electronics, health and information technology. In all of these areas of innovative development, China as a country has performed significantly great that we can hardly check from 1 to 10 among the things we use, without finding at least one that is a product of China, you'll wonder less why Waugh (2018) wrote in his article published by the telegraph that "China has transformed itself from being seen as "the world's factory" to becoming a hive of technology innovation, with ideas that leapfrog the West". He went further to say that China are the Mobile payment leader, Artificial intelligence pioneer and lastly he describes them as Social media powerhouse. To prove his point he backed his statements with some analysis, for example for the Artificial intelligence pioneer he said;

> "Chinese companies are also experimenting with artificial intelligence in bold ways. Search engine giant Baidu recently unveiled the world's first AI park in Beijing, and last year the Chinese government announced its intention to surpass all Westernnations in terms of implementing AI.
> "China is currently the second largest investor in AI enterprises after the US and has ambitions to be the global leader by 2030," says Simon Bussy, head of wealth domain at financial services consultancy Altus Consulting. "It is already the leader in fusing AI with fintech. " An affiliate of [online retailer] Alibaba has made AI-powered technologies a key driver for expanding its businesses, improving customer service, detecting fraud and anticipating issues."

In another development, Scott (2019) said that "What was once a question of whether China can innovate has become one of how it is doing so". Definitely it is a question worth asking, the question we are asking is that if China can, can't Nigeria too? Perhaps this innovative development might have being hampered so far by issues which might include limitations in our schools workshops and the mode of practices among students.

The Concept of Technology Education

ITEA (2000) Define technology education as the study of technology, in which students "learn about the processes and knowledge related to technology". Vries et al (2016) advanced the statement by saying that as a field of study, it covers the human ability to shape and change the physical world to meet needs, by manipulating materials and tools with techniques. It addresses disconnect between wide usage and the lack of knowledge about technical components of technologies used and how to fix them.

Technology Education Lab (2019) described technology Education as an integrated, experience-based instructional program designed to prepare students to be knowledgeable about technology - its evolution, systems, technologies, utilization, and social and cultural significance. According to them; it results in the application of mathematics and science concepts to technological systems in areas such as, but not limited to: construction, manufacturing, communications, transportation, biotechnology, and power and energy. They further said Students are challenged to discover, create, solve problems, and construct solutions by using a variety of tools, machines, computer systems, materials, processes and technological systems.

Another writer Beal (2019) said Technology education is the study of technology. It is designed to teach students to be prepared fora number of technology-related fields, and to learn about technology within specific fields of study. Teachers cover topics related to technology processes, concepts and knowledge. According to him, the broad philosophy of technological education is that students learn best by doing, so the curriculum adopts an activity-based and project-driven approach.

A closer look at the above definitions will further make it clearer that technology education possesses a lot of innovative potentials and can play a very significant role in the innovative and technology development of any nation if given the opportunity to assume it full potentials.

Present State and Challenges of Technology Education Practical Workshops and Practices May, *et al* (2007), observed that technical and vocational education are very much still neglected in the aspect of adequate funding, personnel, modern facilities, staff motivation which consequently are robbing the country of the economic development to be contributed by graduates of technical/vocational education.

Similarly, Puyate in Maeko and Makgato (2014) maintains that in Nigeria the present state of technology education facilities is very poor; there is no planned means to repair broken and damaged equipment or means of purchasing new equipment. Puyate added that there is little or no concern on the part of government, teachers and students for the improvement of the present state of facilities.

Uwaifo (2010) pointed out that technology education departments in some Nigeria tertiary institutions do not have laboratories or workshop space let alone usable equipment and facilities and where they exist, they are grossly inadequate, as the laboratories only have the items or equipment that were provided when the departments were established. He further stated that, surprisingly most technical education departments still depends on engineering workshop and lecturers to teach technical education concepts in this 21st century. He describes such act as shamefully and as a high degree of irresponsibility on the part of the operators of this programme. Aigbepuele (2011) opined that inadequate and ill-equipped Technical Education teachers are challenges to the implementation of Technical Education curriculum.

The greatest challenge facing and TVET and development in Nigeria are the notorious and perennial lack of power supply. Nearly all known vocations required for national development rely on efficient and stable electricity supply. Most private entrepreneurship that grew from the community development initiatives of the oil companies have folded up for lack of public power supply (Kennedy, et al, 2017).

In 2017, a research carried out by Babayo & Abdul on Assessment of Workshop Adequacy and Training Facilities in NCE (Technical) Institutions in the North-Eastern States of Nigeria, reflects that the problems of technology education workshops includes issues like; inadequate space as the number of students entry out numbered the amount of workshops space, the research also indicated that the problem of inadequate space also hinders the installation of machines and other workshop facilities, according to them, the problem of space subsequently makes practical lessons to be conducted in tight and difficult condition.

Lastly, the research reveals that training facilities such as the school workshops, machines, equipment and funds were grossly inadequate with the exception of audio-visual aids and the manual for various machines. After a careful review of the result of the research, the researchers thereafter concluded that practical class could not be done adequately and demonstrated as a result of short in supply of training facilities which affect the practical skills of the students. In addition they said, since the study confirmed gross inadequacy of workshops and could be generalized to all the schools and this includes the workshop inadequacy based on rated and enrolled students per trade, inadequate of floor space per shop based on average class-size and inadequacy of training facilities. The findings, enunciated above, although obtained from observing the facilities both (human and materials) and the state of Colleges of Education Technical in the north eastern states alone may not quite different from what is obtainable in many schools situated in various parts of the country (Nigeria) because the schools are all running the same system. Therefore, whatever remedies are proffered to reduce the effect of the identify obstacles should as well apply to the others.

The need for the Improvement of Technology Education workshop and Practices

The 1991 World Bank policy stressed on the development of a skilled labor force as an important factor for the development of any nation. Involving the private sector, employers of labor and training institutions can be the most effective and efficient way to develop the skills of the work force. Uzoagulu (1993) warns that where equipment and tools are not functional or where their provision is inadequate, technology training programmes will suffer and will lead to the production of unskilled personnel who are unemployable and unproductive.

Umar and Ma'aji (2010) asserted that the availability of appropriate facilities enhances student learning by allowing students to be involved in demonstrations and to continue to build their skills through practice. Okabia (2011) opined that the quality of education depends on the resources such as human, material and finance. if they are not provided in adequate quantities, the goals and objectives of vocational and technology education teachers education is defeated. Ekpo (2010) in his own view said that; a competently trained vocational and technology teacher anywhere in the world needs didactic material/facilities to be effective, and the significance of the resources and their provision cannot be gainsaid. Similarly, Ayeni and Adelabu (2012) stated that the provisions of adequate and appropriate infrastructure are indispensable to the educational process but inadequacy and inappropriateness in Nigeria system contributed to a fall in standard of education. To acquire the right skills needed for wider choice of jobs and career paths, well equipped laboratory and workshop becomes critical(Kennedy, et al, 2017).

Uwaifo in Ojimba (2012) stated that technical education is the training of technically oriented personnel who are to be the initiators, facilitators and implementers of technological development of a nation. He opined that this training of its citizenry on the need to be technologically literate, would lead to self-reliance and sustainability. He stressed that technical education more than any other profession has direct impact on national welfare. A deep reflection on Uwaifo view will make us to understand that, allowing technology education to assume it full potentials by providing all the necessary workshops tools and equipment along side with re-strategizing on workshop practices, will lead to substantial technological development which in another word can be referred to as innovations.
Makgato (2011) pointed out that the quality of technology education programmes is greatly determined by the number of students who acquire the skills for the economic development, knowledge and values needed by society.

It cannot be an over-statement to say that technical and vocational education is the engine of economic growth. No nation can prosecute a war without an army. In the same vein, Nigeria cannot develop without well – equipped technical and vocational institutions. It is a missing link in Nigeria's development policy (Dike, 2009).

Developmental Strategies for the Improvement of Technology Education Practical Workshops and Practices

In addressing problems related to technical and vocational education generally, Okoye and Arimonu (2016) posited that; Adequate resources should be allocated to technical and vocational education. Inadequate funds affect the provision of essentials such as well – equipped laboratories and workshops, relevant textbooks and training manuals, Vocational and technical education requires skilled and proficient teachers. Teachers' preparation should be given a priority attention. There is the need for regular in – service training for teachers of technology to upgrade their skills. Periodical industrial training for teacher is a sinequa-non in other to keep them abreast with the technological changes in the industry, There is the need for our technical institutions to establish good relationship and linkages with similar institutions abroad as this will promote cross – fertilization of ideas and enhance technology transfer. By doing this the technical institutions will have access to new developments, exchange programmes and other numerous benefits available at those institutions whose technical programmes are well developed, When there is collaboration between technical institutions and industries, the relationship will enable the parties appreciate and understand their needs and proffer the right solutions for the benefits of the society and that the curriculum taught in our vocational education institutions should be reviewed to meet the demands of the labour market. Finally they emphasized that there is need to start the teaching of industry-based increase employment opportunities for school leavers of vocational and technical institutions. According to them, it will provide ample opportunities for school dropouts.

Babayo and Abdul (2017) Advice that authorities involve should ensure the provision of adequate workshop and training facilities to meet the challenges of the new world order of science and technology. Dokubo and Dokubo (2013) suggest that the system should be design in such a way that the education received should correspond to the needs of the learners and those of the society at large. Audu, R. et al (2014) posited that the emphasis in retraining should be in the areas of practical skills in the deficient areas as well as the requisite pedagogical skills.

Inti, M. M. et al (2014) put forward that the learning environment should be a replica of working environment. Kennedy, W.G. et al (2017) postulates that; Government should equip TVET workshops with modern equipment, tools and machines to enable TVET teachers and students practice the skills using a replica of what should be obtained in the workplace and as well undertake socially relevant researches. They further emphasized that;TVET teaching practice evaluation form should be modified to assess the cognitive, psychomotor and affective domain in the knowledge transfer process. Students can acquire the right skills only when they are taught with the right tools, equipment and machines in a good environment. There is an urgent need for Government to build a firm foundation for the generation, transmission and distribution of reliable electricity across the country. Nigeria stands the risk of being marooned by this singular factor of poor electricity supply.

Conclusion

The need for the enhancement of technology education workshop and practices in tertiary institutions can not be overemphasized. it will go a long way in allowing student to put their creative thoughts into actions, create more rooms for teamwork, facilitate good students and lecturers/instructors relationship as the lecturer/instructor will as such be able to understand better the student conception and develop plans on to build on them thereby increasing innovation in technology education as new ideas will find their own ground into practices as well as existence.

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CURRICULUM ISSUES AND CURRENT TRENDS IN WOOD WORK TECHNOLOGY

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Abstract
Curriculum as a group of courses or planned experiences in a proper sequence of topics is designed and prepared for the individual, or group of learners for efficient, effective and skillful service in a specific vocation. Therefore, it should be flexible and simple for interpretation so as to achieve the target goal. The paper highlighted on curriculum review as a form of educational reform, issues in planning, development and implementation of curriculum, curriculum innovation and creativity in woodwork technology and current trends in woodwork technology. The concepts of woodwork technology, curriculum, and curriculum issues in woodwork technology were judiciously discussed. The paper revealed among others that, inadequate number and types of machines both stationary machines and the portable power tools necessary for teaching and learning; the large number of students offering courses related to machine woodworking; and inadequate trained woodwork technology teachers dedicated to the programme are some of the issues confronting the design of appropriate curriculum for woodwork technology. The paper recommends that, the National Board for Technical Education (NBTE) should address the curriculum challenges noted in woodwork technology curriculum by the inclusion of current trends in woodwork technology; and Teachers of woodwork technology should embrace the current trends in teaching so as to acquaint students with innovations in woodwork technology.

Keywords: Woodwork technology, curriculum issues and current trends.

Introduction

Woodwork Technology is seen as the activity or skill of making objects from wood by woodwork craftsmen. Woodwork Technology has areas of specialization and these include carpentry, joinery, cabinet making and wood machining (Hornby, 2000). In the same vein, FRN (2013) identified areas of woodwork as follows: Upholstery, carpentry and Joinery, wood machines and furniture making.Woodworktechnology is one of the vocational subjects studied in technical colleges in Nigeria. The goal of Woodwork technology in technical colleges according to National Board for Technical Education (NBTE, 2006) is to produce skilled craftsmen for self or paid employment in the world of work. The skill areas for employment in woodwork include: machine Operations, Furniture Making, Upholstery Design and Construction, Carpentry and Joinery. All these areas of woodwork technology are changing rapidly and as such demand that practitioners should have flexible skills and be able to easily adapt to changes.Like every other practical oriented disciplines, Woodwork also has saleable skills and business opportunities that abound in the trades. It emphasizes learning by doing through cognitive and psychomotor skills (Omege, 2013). It is one of the major trade components of the curriculum of Technical and vocationalEducation.

Curriculum is the offering of socially valued knowledge, skills and attitudes that may be available to students through a variety of arrangements during the time they are at school, college or university. Ibrahim (2011) defined curriculum as a group of courses or planned experiences in proper sequence of topics designed to prepare an individual for efficient service in a specific vocation. This, therefore, suggests that the curriculum for a programme should be adequately planned to enable the achievement of the stated objectives. Ibrahim (2011) looked at curriculum as the planned and guided learning experiences and intended outcomes formulated through systematic reconstruction of knowledge and experiences under the auspices of the school for the lecturers continuous and willful growth in personal social competence.

It is the process and content designed to effect learning of educational values. Ben-Yunusa (2000) maintained that, the curriculum of a subject should be determined by the most fundamental understanding of what could be achieved and the underlying principles that give structure to be the subject. Ben – Yunusa (2000) equally looked at curriculum as the set or sequence of potential experiences set up in the school for the purpose of disciplining children and youth in group ways of thinking and acting. This implies that curriculum is the programme of activities designed for pupils to attain by learning certain specific ends or objectives

Curriculum Review as a form of Educational Reform

Curriculum is central to education at all levels in the world. It is the director, indicator, the light and instrument for possible education. Alade (2016) defined curriculum as a programme of education prepared for definite group of learners within a time frame in order to achieve the intended behavioural outcome. Okundaye (2014) described curriculum as the engine that propels educational achievement for both the individual and the society what they hold up as prize. Curriculum is the medium through which educational institutions seek to translate the societal values into concrete reality. Through it, educational institutions actualize what the society considers as desirable learning.

Curriculum straddles all societies from the literate, pre-literate to the illiterate. It is the heartthrob of development and progress. Byand large, in a passage of time, some communities and ethnic groups know certainly that skills and occupations grew in them on a broader perspective. The informal curriculum in the indigenous society emphasize the development of occupational skills needed as preparation for work in the training given to people (Ivowi, 2013). The productive and competent ability manifested in the recipients and skills became the identity for productivity and employment security. It was the form of education Nigerians knew before the arrival of the colonial missionaries and was geared towards skills acquisition with a view to fighting unemployment, and enhancing the economic well- being of the recipients.

Issues in Curriculum Development

Issues are mostly related to difficult decisions and disagreements that most a time causes debate. If there are divergent opinions on the inadequacy and the planners inability to answer many critical questions underlying the curriculum it becomes an issue. Naeem(2013) believed that, problems and issues are similar because both problems and issues cause debate, concern, and conflict. He further opined that 'Problems can be solved by asking how can something be solved and if the problem cannot be answered easily and people are divided over the problem then it becomes an issue'.

Curriculum development is a continuous process that requires proper planning, a well-planned set of activities, choosing learning experiences and evaluation procedures among others. In woodwork Technology Education, there are a lot of issues ranging from inadequate funding;

obsoleteness of training facilities and equipment, lack of integration of the curriculum to what is obtainable in the labour market and lack of proper investigation of the nature of individuals for which curriculum are meant. In essence, it is apparent to note that the basis upon which woodwork technology curriculum is to be planned must cover economic, social, psychological and philosophical aspect of the society.

Issues in Curriculum Planning and Implementation
Nigeria as a developing nation requires a morerobustcurriculum that will enable her to actualize her dream to become one of the world's biggest economies. It is important to note that many countries have gradually moved away from traditional subject-based curriculum to learner-centred curriculum.

In Rwanda for example, there was a major curriculum reform in their educational sector. There was a paradigm shift from knowledge-based curriculum to competency-based curriculum. Ernest and Helen (2016) reported that, in Rwanda, an important shift was made from a knowledge-based curriculum to a competence-based curriculum and from knowledge and skills acquisition to knowledge creation and application. They further pointed out that the aim is to develop students' independent, lifelong learning habits; appropriate skills and knowledge; and applications to real life situations.

In line with the above discussion, there is the need for our country to stop relying on east or west to define us rather we should define what works for our country today, tomorrow and even 100 years to come. Nigeria as a nation should move away from primitive way of teaching to what is obtainable in the present day.

In curriculum planning, if you want a child to become world class furniture maker, car manufacturer, software developer, computer manufacturer etc, you need to start building that right from elementary school and secondary school.

The huge reform that Nigeria needs is to embark on moving away from traditional subject/content-based curriculum to learner-centred curriculum. Basically, there are three forms of curriculum: Subject-based curriculum, Learner-based curriculum and Problem solving-based curriculum. Therefore, it is of utmost importance for anywoodwork technology curriculum to focus on what learners need for them to function effectively in the labour market after graduation. Most of the countries that perform very well have a curriculum that is learner-based. In China for example, their students are being engaged in practicing how to create equipment and gadgets.

Curriculum innovation and creativity in woodwork technology
Curriculum innovation in woodwork is more of content- driven and examination-centred rather than practically based activities (nature of the trade). Teachers' efforts are geared towards covering the content of the curriculum within approved timeframe of the school calendar. Both the teachers/instructors and the learners work towards ensuring that the examination syllabi are covered. The implication is that there are strands of evidence of deficiency in the creativity, competence and innovation in the learner (Huang, 2013). The Nigerian woodwork students are faced with the challenge in the use of modern equipment/machinery (digital based), in the industry and the workplace of the twenty-first century that requires manipulative skills and a much great ability to solve problems on their own than it has been in the past (Ali, 2013).

There will be less if at all impact made to improve the learners' skill, creative ability with curriculum review and development that promotes theoretical knowledge and places emphasis on paper certification rather than stressing the development of innate abilities and creative potentials in a learner evolving through training and practices (Ajibola, 2015). In curriculum innovation, more emphasis should be of practical activities due to the nature of the trade than theoretical based(Alade, 2015). This will develop the individuals' skills, talents, creativity, competence and innovation, based on the curriculum trend in the society (Okundaye, 2014). This will accommodate technological dynamism in woodwork technology for self-reliance, economic development, and employable skills among others.

Current Trends in Woodwork Technology

The woodworking industry is facing difficult challenges nowadays. This is due to the increase in shortage of timber and the climate change, consequently, a stronger focus on research and development is necessary. Sustainable but also durable panels, which can be produced and consumed with lower emissions need to be further developed and optimised. The challenge is to meet the current as well as future needs and creating panels with the same strong characteristics. At this point plant manufacturers are in great demand to design and make products which will correspond to future needs and which will meet the new requirements of the marketers.

Consequently, it is more difficult for plant manufacturers to cope with these diverse challenges and changes as they should also take into consideration the end-users needs and development of processes and technologies which can be implemented into panel plants. Increase in capacity is another important factor for panel producers. At the same time an effective and efficient process needs to be sustained during production.Therefore, in order to meet future requirements of the woodworking industry, there is the need for all stake-holders to make sure that all hand are on deck to meet up with current and future markets needs in order to face the emerging challenges and support panel producers to get on with the future trend. Presently, Agrifibre is on its rise due to the timber shortage problem. This fibre variety can be used as substitute to raw material for the production of particleboards.oriented strand board (OSB) and medium density fibre board (MDF). Putting high emphasis on producing valuable products with same characteristics as produced with usual timber is essential. Consequently, the challenge here is to enable strong and durable products for same application with agrifibre. **MDF** is made by a process which glues wood fibres together using heat and pressure. The boards are smooth and strong. They are resistant to warping. They have a layered structure which makes fixing to the edges difficult. MDF is a board used industrially for the production of furniture especially shelves and cupboards (Smardzewski, 2015). Special fixings have been designed to enable MDF to be joined effectively. The product is available in a range of thicknesses, 3mm, 6mm, 9mm, 12mm, 15mm, and 18mm (Solid Wood & Panel Technology, 2019).

Current Trends in Upholstery

Upholstery refers to the soft covering found on chairs and seats that makes them more comfortable to sit on. In order for upholstery to give the desired comfort, several materials are use, these include springs, foam, fabrics, leather, upholstering cloth, artifact, cotton, among others. Our upholstery should be an impression of who we are and the class we belong to in the society in which we live. Circle furniture (2019) revealed that, there are few key elements in upholstery that are trending now, that include: layering textured styles, softened shapes, the painting of neutral tones with glam accents, softened geometric and tribal paints among others.When it comes to ability to make a perfect home, every design enthusiast knows that furniture can make or break a space. Choosing the right upholstery–either custom-made or whatever can make your home look unique and beautiful.

Current Trends in Cabinet Making

Cabinet making is one of the components of woodwork technology that has new design trends. Monique and Lucia (2019) featured some of their 'go-to designers' 2019 kitchen designs that reigned supreme which include: clever concealed storage cabinet, pewter and gunmetal hardware, open shelving, vintage vibe, colored upholstery, use of wood cabinet, colored cabinetry, contrasting textures, raw materials cabinetry, integrated appliances cabinetry, pendant light fixtures, hunter green kitchen garners, tall backsplashes clad, lather and wood drawer pulls among others.Open kitchen shelves and wall cabinetry have undergone radical changes than at any time in the past. But with good organization and the right kind of shelves, well designed and constructed they can create a unique style for your kitchen. Bryan (2019) Opined that'open shelving has plenty of benefits. It introduces a light and airy feel offering the illusion of more space which is especially great in smaller kitchens. It is also efficient, since you can see and grab what you need without taking the time to open cabinet doors to look inside'.He further highlighted that there are nine hottest trends that will dominate cabinetry in 2018 which include: Open shelving, color customization, increased use of oak wood, transitional styling, clean aesthetics, and multiple finish color in one kitchen, move over double bowl sinks, storage solution for smart tech, and under cabinet lighting.

Current Trends in Roofing

Roofing refers to the top covering of a building. There are several materials used for roofing surfaces such as wood, metal, solar shingle among others that provides human comfort. Eagle watch (2019) came up with top four (4) roofing trends of 2019 which include solar roofs, cool roofs, metal roofs and designer roofs. The solar roofs will eventually work by integrating panels into traditional-looking roofing materials while the cool roofs were designed to minimize the amount of heat transferred to building by reflecting some of the heat radiated by the sun. The metal roofing is becoming popular and strong, durable, withstands fires, winds, rain and snow. One of the major advantages of metal roofing is its reflective properties, it doesn't absorb heat and it also gives strong protection, low maintenance, that's why metal roofing becomes a global trend. Lastly, the designer roofs became the most recent trend in roofing industries because of its properties to withstand hurricane force winds and resistance to fire. Green or living roofs areother trends in roofing industries. Chris (2019) noted that these roofing systems have multiple layers such as engineered soil, protective fabric, and waterproof membrane and have a beneficial influence on the environment by creating a natural habitat and reducing acid rains.

Current Trends in TechnologyEducation

The last few years have witnessed a dramatic change in the learning model. The way students are being taught today is very different from the teaching methods that were adopted a few decades back. Technology has brought about various changes in the way education is delivered and received. From subject/content-based to competency-based approach, we have seen technology make a considerable impact on the learning and teaching methodologies. With numerous benefits to offer, digital learning has become an important part of the education system. Schools and universities are trying to implement the latest in education technology in order to improve the teaching and learning process. The following are some of the current trend in technology education: Collaborative Learning, Learning outside the Classroom Environment, Social Media in Learning, Interactivity in Classroom, Data Management & Analytics, Immersive Learning withaugmented reality and virtual reality (AR and VR), Gamification in Education, Online Data and Cyber security among others.

Curriculum Issues in Woodwork Technology and the way forward

Most technical institutions in Nigeria are not sufficiently equipped with trained personnel and modern woodwork materials. Ibeneme (2007) stated that the underfunding of technical institutions affects the supply of up to date facilities and equipment needed to train workers of the 21st century. He further stated that there are few trained technical teachers dedicated to the programme. Vocational training has been an integral part of national development strategies in many societies because of the impact on human resource development, productivity and economic growth (Dike, 2007). A good workman must possess the right skill in woodwork for optimal productivity and creativity. He further opined that there are two problems confronting woodwork curriculum in vocational institutions in Nigeria. These problems are those of inadequate number and types of machines; both stationary machines and the portable power tools necessary for teaching and learning and the large number of students offering courses related to machine woodworking. The graduates are looked upon as unemployable, because they lack skills required for good quality performance in industries. Also they could not create jobs for themselves due to lack of skills (Abassah, 2014). This has been traced to poor practical and workshop activities that are not properly implemented. The challenge is to meet the current as well as the future needs of the country. These could be overcome by having a well-planned curriculum reform that will give much emphasis on learners, that is, learner-centered not subject/content-based curriculum.

Conclusion

Functional woodwork technology education requires the manipulation of machines, hand and portable power tools to acquire therequisite skills necessary to function in the labour market after graduation. It was concluded that, there are curriculum issues in planning, development and implementation of woodwork curriculum that call for urgent review of the curriculum to tally with what is obtainable in the present global trend. It also concluded that there are current trends in woodwork technology, cabinet making, upholstery, roofing, as well as current trends in technology education that requires collaborative learning, learning outside the classroom environment, use of social media, immersive learning with augmented and virtual realities among others that requires the teachers of woodwork technology to embrace the current trends so as to equip students with necessary skills that will enable them meet up with modern trends in woodwork technology.

Recommendations

Based on the available literatures reviewed, the study made the following recommendations:

1. The National Board for Technical Education (NBTE) should address the curriculum challenges noted in woodwork technology curriculum by the inclusion of currents trends in woodwork technology.
2. Teachers of woodwork technology should embrace the current trends inteaching so as to acquaint students with innovations in woodwork technology.

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EFFECTS OF LABORATORY TECHNIQUE ENRICHED WITH SAFETY TRAINING ON INTEREST AND PERFORMANCE TOWARDS PRACTICAL BIOLOGY AMONG SECONDARY SCHOOL STUDENTS IN LERE, KADUNA

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Abstract
The study investigated the Effects of Laboratory Technique enriched with safety training on interest and Performance in Practical Biology among Secondary School students in Lere, Kaduna. The study was guided by three research objectives, research question and Null Hypotheses. A quasi-experimental design using pretest and posttest for both experimental and control groups was used in the study. The population consists of 1980students, 1267 males and 711 females respectively. A sample of 107Secondary School Biology students were randomly selected and were further divided as experimental and control groups. The instruments used were Laboratory Safety Technique Performance Test (LSTPT) and Students Interest Questionnaire (SIQ); the two instruments were validated, pilot tested and the reliability for the two was found to be 0.75 and 0.72 respectively. At the end of the treatment data were collected and analyzed using t-test, Kruskal-Walis statistics. The results obtained showed that; Significant difference exists in the performance of students exposed to laboratory technique enriched with safety training and those exposed to Lecture method; The results of the study revealed that differences of 14.3 existed on Interest shown when students are exposed to laboratory Technique enriched with safety training. From the findings, recommendations were made one of which: the use of laboratory Technique enriched with safety training should be encouraged among Biology teachers by organizing seminars, workshops and talk shows on the importance of safety measures in the laboratories.

Keywords: Laboratory Technology, Safety Training, Interest, Performance

Introduction
Science can be defined as the systematic enterprise that builds and organizes knowledge in the form of testable explanations and prediction about nature and universe. This knowledge is determined through the scientific method by experiments and observations, and may take the form of scientific facts, scientific models or scientific theories (Science online Etymology Dictionary 2014). Other scholars defined science as a human activity that leads to the production of a body of universal statements called laws, theories or hypotheses which serves to explain the observable behaviors of the universe or some aspects of the universe (Shaibu,2008). According to Usman (2008), science is a method or process which requires observations and problem solving, it is not dogmatic and has special characteristics that its tenets are universal and capable of production under same conditions.

Since science is a process requiring interaction with materials to stimulate internal conceptions, the Federal Government of Nigeria in the National Policy on Education (FME, 2013) deemphasized the memorization and regurgitation of facts but instead emphasized practical, exploration and experimentation methods of teaching otherwise known as hands-on which can lead to sustainable development of the students (Isa, 2007). National Association of Biology Teachers (NABT, 2005) defined laboratory as a place where students use process and materials of science to construct their own explanation of biological phenomena. They observe, collect data and interpret data of life process, living organisms and simulations of living phenomena. These activities in Biology provide opportunities for students to actually do science as opposed to learning about science. Nzewi (2008) asserted that laboratory activities can be regarded as a strategy that could be adopted to make the task of a teacher (teaching) more real to the students as opposed to abstract or theoretical presentation of facts, principles and concepts of subject matters. However, laboratories are endowed with hazards which can lead to the occurrence of accidents and jeopardize the safety of all its users especially students. Laboratory safety training can be seen as the activity or process of teaching and learning or imparting and acquiring of skills, techniques or abilities of preventing harm, accident, injury and hazard in the laboratory. It also provides guidelines for students when developing safety ways to carry out practical works. This will enable practical work, a necessary part of the overall education in experimental Biology, to be carried out more safely in school laboratories. Consequently, students must acquire the necessary skills to carry out such work in safety andwith confidence (Roinn 2007).Conventional teaching methods are instruction strategies which make the teacher more active and the learner passive participant in the teaching learning environment (Danjuma, 2017). Teaching methods like lecture, discussion, and role-playing among others are classified as conventional teaching methods. Wada, (2016) maintained that lecture method makes the instruction boring and the facilitator cannot carry the audience along.

Another important variable is academic performance. Popoola (2010) sees performance as an expression used to present student's scholastic standing and which is a function of various factors such as methods of teaching, teacher's qualification, child home background, school environment, and interest among others. Academic performance is the outcome of education – the extent to which a student, teacher or institution has achieved their educational goals and academic performance is commonly measured by examinations or continuous assessment, but there is no general agreement on how it is best tested or which aspect are most important procedural knowledge such as skills or declarative knowledge such as facts (Howard & Murray, 1996). For long educators have continue to call for need of the mode of teaching that promotes performance in students (Lawson & Thompson 1988; Esiobu & Soyibo 1995; Okafor & Okeke, 2007) While Fair brother (1988) observed that student performance in science depends on their understanding of science concepts. Understanding to him is more than just recall of knowledge; it involves manipulating the knowledge for some purpose. He went further to state that testing for understanding requires having some ideas of what students will be doing when they demonstrate understanding. Therefore, the study intends to investigate if laboratory technique enriched with safety training has effect on Academic Performance and Interest towards Practical Biology among Secondary School Students in Lere, Kaduna State-Nigeria.

Statement of the Problem

The problem mostly encountered in science laboratory occurs from improper instruction and lack of knowledge concerning the reagents, glasses and other equipment's used by science students in the laboratory. Most of the studies carried out on laboratory management showed that fatal accidents occurred as a result of ignorance (lack of knowledge) of hazards and safety measures associated with the materials and equipment's (Adigun ,1999). Atadoga and Onaolopo (2008) also stated that many times carelessness on the part of the teacher or students have led to fire outbreak and other types of hazards in the school laboratory. In spite of the rules and regulations displayed in many schools, science laboratories accidents still occur(Ado & Olorukooba 2009). Therefore, the importance of laboratory safety technique cannot be overemphasized as science laboratories need to be safe places to work for effective teaching and learning of science. Muoneme (2016) reported that when lecture method is used, the interest of learners is not always boosted and hence affect the performance of the students due to lack of interest. Therefore, this study sought to investigate students' Interestto Biology practical as well as the effect of laboratory technique enriched with safety training on Academic Performance among Secondary School Students in Lere, Kaduna State.

Objectives of the Study

The research has the following objectives, to:

1. Determine the difference in the Academic Performance between Biology students exposed to laboratory technique enriched with safety training and those exposed to Lecture method.
2. Investigate the difference in Academic Performance of male and female students exposed to laboratory technique enriched with safety training.
3. Ascertain the difference in the interest shown in Biology by SSS students when exposed to laboratory technique enriched with safety training and lecture method.

Research Questions

This study sought to answer the following research questions:

1. What is the difference in the Academic Performance between Biology students exposed to laboratory safety training and those exposed to Lecture method?
2. What is the difference in the Academic Performance scores between male and female students exposed to laboratory Technique enriched with safety training?
4. What is the difference in the Interest shown in Biology by SSS students when exposed to laboratory technique enriched with safety training and lecture method?

Null Hypotheses

Based on the research questions stated the following null hypotheses were formulated and tested
at $P \leq 0.05$.

H_{01}: There is no significant difference between the Academic Performance of Biology students exposed to laboratory Technique enriched with safety training and those exposed to Lecture method.

H_{02}: There is no significant difference in the Academic Performance scores between male and female Biology students exposed to laboratory Technique enriched with safety training.

H_{03}: There is no significant difference in the Interest shown in Biology by SSS Students when exposed to laboratory technique enriched with safety training and lecture method.

Methodology

The design adopted for the study is quasi experimental design, using pre-test, post-test experimental and control groups. The experimental group was exposed to laboratory safety training before the commencement of Laboratory Safety Technique Performance Test (LSTPT) as well as Student Interest Questionnaire (SIQ) while the control group was denied. After the administration of the instrument the result of the two groups were compared to determine the impact of laboratory safety training on students' academic performance.

Population of the Study

The concept population refers to the entire set of subjects or the phenomena about which data are to be generated (Okoye 2012). Therefore, the population of the study comprised all the Biology Secondary School Students in Lere, Kaduna state. There are twenty-two Secondary

Schools in Lere Education zone. The total population of these students is 1980, of which 1269are males and 711 females.

For the purpose of this study the two Senior Secondary Schools are used as sample where school A was the experimental group and school B was used as control group. Simple random sampling of balloting method was used to obtain the number of students. Thus, a total number of 107 students comprising of 54male and 53 female students with average age of18 were used as sample.

Instrumentation
For the purpose of this research, two research instruments were constructed which are Laboratory Safety Technique Performance Test (LSTPT) to determine the impact of laboratory technique on Academic Performance of students adapted from Bagiwa, (2016) and Student Interest Questionnaire (SIQ) which is a questionnaire regarding students' Interest towards practical Biology adapted from Danjuma, (2017).

The instruments were validated by experts who are PhD holders with minimum rank of senior lecturer in the Department of Science Education, Ahmadu Bello University Zaria. This is in line with Sambo (2008) who maintained that the best procedure for validating research instrument is to give to a panel of experts. The experts' response to the instrument's questions, and corrections and recommendations were made and effected on the basis of content and construct validity of the instrument to produce a new draft of the items.

A pilot test was conducted using students of Government Secondary School Ramin Kura which was part of the study population but not used as one of the samples. A total of 30 students were used during the pilot testing to establish the reliabilities. The first test was given to the subjects of the school which were not part of the sample. After two weeks interval the second test was administered in line with Tuckman (1975), recommendation of two weeks interval for test-retest procedure. Pearson Product Moment Correlation Coefficient (PPMC) statistics was used to analyze the reliability coefficient of Laboratory Safety Technique Performance Test (LSTPT). Based on the data obtained from the pilot study of the instrument, the reliability was found to be r=0.75, The reliability coefficient of Student Interest Questionnaire (SIQ) was found to be 0.72 using the Cronbach-alpha method of estimating reliability. Olayiwola, (2010) asserted that an instrument is considered reliable if it lies between 0 and 1, and that the closer the calculated reliability coefficient is to zero, the less reliable is the instrument, and the closer the calculated reliability co-efficient is to 1, the more reliable is the instrument. The fact that the reliability of the three instruments are closer to one than to zero confirmed that all the instruments were reliable.

Presentation of Results
The following null hypotheses were formulated for testing, at 0.05 level of significance. The hypotheses were analyzed using independent t-test and Kruskal-Walis.

Research Question One: What is the difference in the Academic Performance between Biology students exposed to laboratory safety training and those exposed to Conventional method?

Table 1: Difference in the Academic Performance Between Biology Students in Experimental and Control Group.

Groups	N	Mean	Std	Std Err	Mean difference
Experimental	51	57.400	3.922	.716	20.13
Control `	56	37.266	3.838	.700	

Table 1 showed the results of the mean score of the academic performance of students taught Biology Practical using Laboratory Technique enriched with safety training and those taught with lecture method. Their mean academic performance was 57.400 and 37.266 by experimental and control group, implying a mean difference of 20.13 in favor of the experimental group. This shows that students who were taught with Laboratory Safety Technique enriched with safety training method performed academically higher than those taught with Convention method.

Hypothesis One: The null hypothesis state that there is no significant difference in the mean Academic Performance of Biology students exposed to laboratory Technique enriched with safety training and those exposed to Conventional method.

To answer the research hypothesis, t-test was used for the analysis at $p \geq 0.05$ level of significance for retaining or rejection of the null hypothesis.

Table 2: Independent t test Statistics on Differences in the Mean Academic Performance of Students in Experimental and Control Group.

Groups	N	Mean	Std	Std Err	Mean difference	df	P	Remark
Experimental	51	57.400	3.922	.716	20.13	116	0.003	S
Control `	56	37.266	3.838	.700				

P ≤ 0.05

The result in Table 2 showed that the p-value of 0.003 was observed at df= 116. Since the p-value was less than the alpha value of 0.05, it means therefore that the difference in the academic performance of students taught Biology with Laboratory Technique enriched with safety training and those taught with conventional method was significant in favor of the experimental group. Therefore, the null hypothesis which states that there is no significant differences in the mean academic performance of students taught Biology with Laboratory Technique enriched with safety training and those taught with the Conventional method was rejected.

Question Two: What is the difference in the Academic Performance scores between male and female students exposed to laboratory Technique enriched with safety training?

Table 3: Difference in the Academic Performance Between Male and Female Students exposed to laboratory Technique enriched with safety training.

Groups	N	Mean	Std. Dev	Std. Err	Mean Diff.
Male	54	45.300	8.6239	1.5745	
					0.466
Female	53	45.766	9.9807	1.8222	

In Table 3, the outcome of the statistics showed that there was difference in gender when SSS students were exposed to laboratory Technique enriched with safety training on Academic Performance. Their computed mean of Academic Performance was 45.300 and 45.766 by male and female respectively, indicating a mean difference of 0.466 in favor of female.

Hypothesis Two: There is no significant difference in the Academic Performance between male and female students when exposed to laboratory Technique enriched with safety training.

To answer the null hypothesis, t-test was used for the analysis at $p \geq 0.05$ level of significance for retaining or rejecting the null hypothesis.

Table 4: Independent t-test Statistics on the Difference in the Academic Performance Between Male and Female Students.

Groups	N	Mean	Std. Dev.	Std. Err	df	P	Remark
Male	73	45.300	8.6239	1.5745			
					116	0.847	NS
Female	45	45.766	9.9807	1.8222			

P ≤ 0.05

The result in table 4 showed that the p-value of 0.847 was observed at df= 116. Since the p-value was greater than the alpha value of 0.05, it means therefore that the difference in the Academic Performance between male and female students when exposed to laboratory Technique enriched with safety training method was not significant. Hence the null hypothesis which stated that there is no significant difference in the academic performance between male and female students when exposed to laboratory Technique enriched with safety training, was retained.

Research Question Three: what is the difference in the Interest shown in Practical Biology by SSS students when exposed to laboratory technique enriched with safety training and conventional method?

Table 5: Difference in the Interest Shown in Practical Biology by SS II Students in Experimental and Control Group.

Groups	N	Mean	Std. Dev	Std. Err	Mean Difference
Experimental	51	97.65	2.45	0.971	
					14.3
Control	56	83.35	2.66	1.201	

Table 5 revealed that difference exist in the interest shown by SSS students when they were exposed to laboratory technique enriched with safety training method. Their mean interest Scores were 97.65 and 83.35 in posttest experimental and posttest control respectively. When the difference between their interest rates was computed, it was found to be 14.3 in favor of experimental group. This clearly indicated that students exposed to laboratory technique enriched with safety training method i.e. experimental group showed more interest in Practical Biology than the control group.

Hypothesis Three: There is no significant difference in the interest shown in Practical Biology by SSS students when exposed to laboratory technique enriched with safety training and conventional method.

Table 6: Kruskal-Wallis Non-Parametric Rank Test Difference in Practical Biology Interest

Shown by SSS II Students in Experimental and Control Group.

Groups	N	Mean Rank	Df	P	Remark
Experimental	51	97.85	116	0.001	S
Control	56	83.35			

P ≤ 0.05

In Table 6, the p-value of 0.001 was observed at df= 116. Since the p-value was less than the alpha value of 0.05, it means therefore that the difference in the interest shown by SSS students when exposed to laboratory technique enriched with safety training and those taught with conventional method was significant in favor of the experimental group. Therefore, the null hypothesis which stated that there is no significant difference in the interest shown by SSS II Students when exposed to laboratory technique enriched with safety training and lecture teaching method in Biology, is hereby rejected.

Discussion of Results

The objective of this study was to investigate the Impact of Laboratory Technique enriched with safety training on Interest and Academic Performance towards Practical Biology among

Secondary School Students in Lere, Kaduna State, Nigeria. Three Research Questions were answered and Three null hypotheses were tested.

The result of analysis presented in Table 1 showed that students in the experimental group who are taught Laboratory safety Training performed significantly better and achieved higher than the control group. In other words, it implies that significant positive effect exists as a result of exposing students to laboratory Technique enriched with safety training. This finding is in line with the work of Dewey (1938) who examined the effect of laboratory use on students' Performance in general science as compared to lecture method of instruction; his result revealed that experimental group outperformed the control group in all achievement area.

Table 3, it was observed that students taught using laboratory Technique enriched with safety training perform almost equally, this could be due to the fact that laboratory Technique enriched with safety training is gender friendly. This conforms to the findings of Mari (2001) who revealed superiority in performance of female students over their male counterpart in task involving science process skills. This disagreed with the work of Wallace (2007) who revealed in a study that both males and females who were taught using laboratory Technique enriched with safety training. However, Ogunleye (1999) revealed that, gender differences may exist in many different areas of education from performance to interest, from classroom activities and course enrolment to perceptions about careers.

Also, in Table 5, it was observed that students taught using laboratory Technique enriched with safety training had more interest towards Biology than those taught Biology using lecture method. This indicated that the use of laboratory Technique enriched with safety training enhanced/boosted students' interest towards learning of Biology. Increased interest towards learning of Biology recorded could be due to use of laboratory Technique enriched with safety training and the general fun experienced during the lesson when laboratory Technique enriched with safety training is used. This support to the findings of Renninger, (2002) who observed that the use of laboratory Technique enriched with safety training raises the level of concentration and enhances learning because it is fun. Furthermore, other reasons that could be adduced to be behind enhancement and boosting of student's interest when taught with laboratory Technique enriched with safety training could be that students who learned with laboratory Technique enriched with safety training were more attentive and engaged in learning, participated more actively in the classroom, interacted much more with the teacher, their peers. This is in line with Oladejo, (2011) who found out that, an individual's attention and/or engagement with particular events and objects determine the direction of interest development. Therefore, with the empirical evidence in this study, it is shown that the use of laboratory Technique enriched with safety training is necessary for boosting students' interest towards learning of Biology.

Conclusion

Because laboratory technique enriched with safety training was practically oriented it has viability of enhancing students' Interest and Practical Performance since the students are more involved in practical activities rather than mare demonstration technique.

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GOOD GOVERNANCE: THE PIVOT OF ACHIEVING QUALITY PRIMARY EDUCATION IN THE 21ST CENTURY FOR SUSTAINABLE NATIONAL DEVELOPMENT

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Abstract
Primary education is the basis or foundation upon which all level of education is built. A sound and quality primary education determines the learner's performance at the secondary and tertiary levels of education. The paper attempts to examine concepts of primary education, quality education, good governance and sustainable national development. The paper also attempts to identify the challenges facing the attainment of quality primary education in Nigeria which includes lack of confidence learning environment inadequate personnel, lack of qualified personnel, Inadequate/poor funding; poor payment of teachers salaries and allowances. The paper concludes that good governance is the best option for attaining quality primary education in Nigeria for sustainable national development. It has recommend that qualified teachers should be recruited, adequate budgetary allocation should be made available to education and special salary package should be introduce for teachers in primary school to put in their best for quality primary educational attainment and sustainable national development.

Key words: Primary education, quality education, good governance and sustainable national development

Introduction

Primary education is the base or basic foundation to all level of education the world over Nigeria inclusive. Primary education is the pillar upon which all levels of education starting from junior secondary to university lies need to be adequately taken care of since the foundation is the basis for the success or failure of any project to be embarked upon. This is due to the fact that, if a building foundation is properly laid, the building can hardly collapse with time, but if the foundation is poorly laid it will easily collapse. Excellent education policies are meaningless without corresponding excellent teachers to see their realization. Therefore there is need to employ teachers that are knowledgeable, progressive, effective, competent and efficient at all levels of education for qualitative growth and development in the teaching profession in Nigeria most especially at the primary schools since they are the foundation upon which all other levels of education are built. One will regret the conscious effects of ignorance on a nation and so to this end, one can proudly state that the spindle upon which education policies rotates is the teacher.

Primary education is preceded after baby class, pre-school, pre-unit or nursery education and eventually lower and upper primary schools which are followed later by secondary education (Abdullahi, 2013). He further explained that in the United States of America (USA), education is very much part of daily lives with more than one in every four aged 3 and older enrolled into school. In Africa, over the past decade many countries in sub sahara Africa like Malawi (1994), Zambia (2002), Tanzania (2001), Uganda (1997), Kenya (1963) including Nigeria (1976) introduced Free Primary Education to revive educational system that has been on the decline and even suffered enrollment after the initial growth after independence due to several factors like inability of the parents to cope with their responsibilities, environmental factors and corruption.

Successive government in Nigeria has put measure to raise educational standards in the country such as UPE and YBE for quality educations at primary levels in Nigeria yet positive results has not been achieved despite the laudable objectives of education as inclined in the National Policy on Education (NPE2013) which includes the development of:

i. Free and democratic society.
ii. Just and egalitarian society.
iii. Land of bright and full opportunity for all citizens.
iv. United string and self reliant nation.
v. Great and dynamic economy.

Nigerian education system at all levels suffer from one problem or the other and part of Nigerian economy is not left out be it in the health, agriculture , military, air force, navy, police, custom, immigration, prisons, aviation, petroleum and many more too numerous to mention. All these challenges we are having in Nigerian society at times have their origin rooted in shallow primary educational attainment. Nigerians had not at anytime been fully satisfied with the performance of its education in meeting national needs before and after independence. Though an effort by some educationist to remodel the nation's educational system began before independence (Gusan 2008). The effort became more emphasized in 1969 during the national curriculum conference held in Lagos lending to the called the emergence of a document on education called the National policy on education printed first in 1977 (Yusuf and Yusuf 2000). The document spelt's out clearly the philosophy, goals, design and content of Nigerian educational system at various levels. Quality assurance in education is a unit in educational institution that enhances teacher's productivity and quality in educational attainment in all levels of education through proper monitoring and supervision.

Surprisingly, it is becoming increasingly clearer to many stake holders in education industry that Nigerian education is deficient in her products compared to the goals, design, philosophy and content of the educational system which is geared towards solving national problems for growth and development (Omede 2012). Education of many country suppose to be the light through which it see and the base of growth and development. This is because without quality education, no country can grow economically, politically, socially, culturally, spiritually, morally, technologically and scientifically. As a result of important role of education, government all over the world have placed high premium on educational development of their various nations. In recognition of the above assertion the United Nations general assembly states in 1948 that every individual has the right to compulsory education at the primary school level (Adagba 2013). Successive government in Nigeria have established policies and programs aimed at achieving policies and programs of Universal Primary Education (UPE) in 1976 during General Olusegun Obasanjo regime .The 6-3-3-4 system of education and Universal Basic Education (UBE) was re-launched in 1999 September 30th by president Olusegun Obasanjo as well (Nder 2013) all aiming at achieving quality education in Nigeria but it seems that all efforts put in place to achieve those aims is a mirage probably as a result of corruption and poor implementation among others.

Conceptual Clarification

The Paper attempt to clarify some concept such as good governance, quality education, quality assurance, and sustainable development.

Good Governance

Good governance can be described as the effective and efficient management of public affairs and resources by democratically elected leaders and their appointees. According to Ayantayo (2012) he defines good governance as a process of a specific part of management or leadership processes. He further defines good governance as something that relates to decision which define expectations, grand power, or verify performance. According to political analyst, good governance consist of eight characteristics which are participatory, accountable, transparence, responsive, consensus oriented, effective and efficient, equitable and inclusive as well as in accordance to the rule of law. Effectiveness and efficiency, accountability and transparency are key requirement of good governance on the part of public officers in decision making.

Quality Education

Quality education has been described by many scholars in different ways due to their divergent level of knowledge. Quality Education is that type of education that produce effective and functional citizens that contribute to the development of the society socially, morally, culturally, politically, economically and technologically. Quality education is a multidimensional concept which should embrace all functions and activities like teaching an academic programmes, research and scholarship, staffing and students, building facilities, equipments, services to the community and academic environment as affirmed by Agih (2011). He explain further that quality education requires both human non material resources and effective teaching and learning therefore central to the development of any nations as a conscious effort to develop the human resources. "Surprisingly, since 1960's it was only educated people equipped with skills and could catalyze development. Japan, Korea, Thailand, Malaysia and the Asia citizens have maximally applied the theory for development engineering. Sadly however, Nigeria has only paid lip service to human development" (Idumeji 2007). Quality education is defined by five elements: the learner's outside experiences, learning environment, content of education, learning processes, and education outcomes. Learners must be healthy, well- nourished and supported by their families and communities. The learning environment should be safe, healthy and stimulating. Appropriate education content is relevant to the learners and presented in a well-managed classroom. Learning out comes should meet and promotes participation in society. All five of the factors must be present for learners to receive a quality education. To measure the quality of education, outcomes are examined. Learner's academic achievements should match their age and grade level and meet national standards. Quality education is essential to real learning and human development which is influenced by factors both inside and outside the classroom, from the availability of proper supplies to the nature of a child's home environment. In addition to enabling the transfer of knowledge and skills necessary to succeed in a profession and break the cycle of poverty, quality plays a critical role in closing the gender gap in basic education (UNICEF, 2017).

A quality education is not one that is measured purely by a test score or by how many words per minute a 5-year old can read. To hark back to these simplified measurements is to do a disservice to both the student and the phrase quality education itself (Slade, 2017). Quality education is one that focuses on the whole child, the social, emotional, mental, physical, and cognitive development of each student regardless of gender, race, ethnicity, socioeconomic status, or geographic location. It prepares the child for life, not just for testing. A quality

education provides resources and directs policy to ensure that each child enters school healthy and learns about and practices a healthy lifestyle ;learns in an environment that is physically and emotionally safe for students and adults; is actively engaged in learning and is connected to the school and broader community; has access to personalized learning and is supported by qualified, caring adults; and is challenged academically and prepared for success in college or further study and for employment and participation in a global environment. A quality education provides the outcomes needed for individuals, communities, and societies to prosper. It allows schools to align and integrate fully with their communities and access a range of services across sectors designed to support the educational development of their students. Quality education is supported by three key pillars: ensuring access to quality teachers; providing use of quality learning tools and professional development; and the establishment of safe and supportive quality learning environments (slade, 2017). Quality education is one that provides all learners with capabilities they require to become economically productive, develop sustainable livelihoods, contribute to peaceful and democratic societies and enhance individual well-being.
Some of the key elements that affect the quality of education with regards to the current study includes: what students bring to learning, environments, content, processes and outcomes.

Quality Assurance

Since Primary education is the foundation upon which other levels of education is built, it is expected to produce learners within the context of the needs of the nation for attainment of its goals by intensifying efforts and diversifying their programmes for production of qualified and well trained manpower that will bring about a change in behaviour and attitudes of the learners in an expected manner. Abanyam (2010) in support of the above assertion stated that policy expects college of education to make optimal contribution to national development by intensifying and diversifying their program for development of manpower to achieve its goals.

In other to achieve quality primary education and attain the objective of social studies at the primary school, there is need to establish quality control and assurance in the various local government education authority (LGEA) to monitor surprise and ensure quality in teaching and learning process for the attainment of desired objective of social studies at the primary school. Quality accordingly to Ogbuanya and Usoro (2009) is the level of achievement, a standard against which to judge others .In the opinion of Ugwu (2012) he note that quality is essentially about learning what one is doing well and doing it better. It is equally concerned about what one may need to change to make sure one meets the needs of the service user.

Quality assurance is a process of viewing and accessing what pertains to an institution to ensure that the functional aspect of the institution is maintained the purpose of quality assurance is to build capacity within an institution for pursuing quality improvement leading to stakeholders satisfaction (Manickam & Begun, 2011).To them, This can be achieved through quality assessment involving both internal and external process. It keep the institution abreast of the needs and demands of individual and groups. It is a continuous process aiming at excellence. This could come in form of self analysis and assessment internally within an institution of learning be it primary, secondary and tertiary levels respectively. Quality control and assurance also takes the form of external accreditation when external accreditation teams are involved in accessing the level of quality of an institution. Some agency have a focus on in-service and pre-service teacher education which other are engage in enhancing professional development of teachers for varied aspect of education, granting quality assessment and accreditation.

However, quality assurance determine quality, both fitness for purpose and fitness of purpose (Ode & Ochim, 2011).To them fitness for purpose is related to educational missions in an institution of learning of what have been set for themselves while fitness of purpose is their ability and capacity to achieve the national goals. Ahobee (2011) sees quality assurance as a proactive means of ensuring quality in educational programme. Quality control and assurance in educational programme aims at preventing quality problems by ensuring that the product of system is in conformity with expected standard in education. The principal responsibilities of quality control and assurance lies in the institutions themselves and that of National Commission for Colleges of Education (NCCE) which is charged with the responsibility of overseen the affairs of Colleges of Education in Nigeria which produces teachers who finally knowledge in the learners at the at the primary and junior secondary school level.

Quality assurance has been assumed by the NCCE to reflect on standard and qualification of teachers in colleges of Education, junior secondary school and primary schools as well as academic growth up to professional level. This assumption could only be interpreted when teachers are assessed for quality in their performance and learners achievement. In support of the forgoing, analysis, Olejide (2009) note that, the interest of quality control and assurance (QCA) is to carry out periodic audit of their programmes to identify their strengths and weakness. To Olejide, audit should cover teaching effectiveness, assessment of courses and teachers, textbooks, instructional facilities, capacity development to ensure that the needs of services users (learners) are met.

Functions of the quality assurance unit

Functions of quality control and assurance unit in education according to National Commission for Colleges of Education (2017) among others includes;

a) Develop, apply and periodically review the quality benchmarks/parameters for various academic and Administrative activities of the institution.
b) Facilitate the creation of a learner- centered environment conductive to quality education and academic staff professional growth;
c) Provide feedback mechanisms for students, parents and, other stakeholders on quality-related issues;
d) Disseminate information on various quality parameters of teacher education;
e) Organize inter and intra institutional workshop, seminars on quality related themes;
f) Document various programmes/activities leading to quality improvement;
g) Act as the model unit of the institution for coordinating quality-related activities, including adoption and dissemination of best practices;
h) Work closely with academic department and the institution's Management information Systems (MIS) for the purpose of management/enhancing the institutional quality;
i) Promote and help sustain the culture of quality on the institution.
j) Lead the internal self-assessment process and prepare and submit the Report to the Management of the College and the National Commission for Colleges of Education (NCCE) annually ;and
k) Coordinate Logistics during external accreditation/assessment

Sustainable Development

Developments as a concept need to be clarify before proceeding to take a look at sustainable development. Oladosu (2014) conceptualize development as an inclusive concept which covers social political and economic facet, it involves qualitative and quantitative transformation of people's life. Development covers attitude, structures, institutions, economic growth, improved capabilities and conditions of human life (Oladiti and Oyewale, 2010). Sustainable development is defined multidimensional as a result of differences in the opinion of scholars from different perspective. Sustainable development connotes an intergenerational development that takes into consideration not only the wellbeing of present but also that of future generation (Wahab, 2014). Sustainable development refers to a gradual process of growth towards a more advance stage in a continuous manner. According to Oladosu (2014), sustainable development addresses four major challenges faced by states in their efforts at maximizing the welfare of the people. The four challenges are;

i. Achieving competitiveness in a diversify economy.
ii. Refocusing agriculture to remove hunger.
iii. Reducing the gap of inequality and poverty.
iv. Promoting peace and mutual coexistence.

However, in the content of this paper, it is imperative to add attainment of quality education as one of the challenge faced by a state. Therefore, sustainable development is possible to the extent by which the state is able to attain the above ideals if it can be uninterruptedly withstand stress that tends to undermine its development.

Challenges to the provision of Quality Education in Nigeria

There are many challenges that face the provision of quality education in Nigeria. Some of these challenges hinder the attainment of primary school Social Studies in Nigeria and North Central Geopolitical Zone in particular. Among the challenges facing the provision of quality education in Nigeria are; lack of qualified Teachers, inadequate recruitment of staff, poor learning environment and class rooms, lack of instructional materials and textbooks, nonpayment of teachers salaries as at when due, bad leadership, lack of proper monitoring and supervision of teachers by relevant authorities, poor welfare of teachers, corruption , parent attitudes towards staff and school management, lack of seriousness in the learner and inadequate funding by the Government among others.

Many scholars view challenges facing the provision of quality education in Nigeria from different perspectives due to their divergent opinions. According to Joseph (2018), he outlined challenges of quality primary education to include, lack of experience and adequate teachers, lack of proper management of schools, lack of teachers training, lack of proper inspection routine to primary schools by relevant authorities and lack of appropriate implementation of primary education policy. Some of the submissions put forward by Joseph are in agreement with the researcher's view. In another related development, Kolawale (2018), also supported the view of the researcher and Joseph by itemizing fifteen (15) problems facing quality primary education in Nigeria as thus;

i. Poor funding
ii. Poor governance
iii. Corruption
iv. Indiscipline
v. Lack of responsibility and control
vi. Poor parenting and guidance
vii. Lack of infrastructure
viii. Politicization of education
ix. Unwillingness to study education courses in schools
x. Lack of good teachers welfare
xi. Unstable staff
xii. Unstable curriculum and subjects
xiii. Unaffordable education
xiv. Lack of teaching aids

xv. Scarcity and prohibitive cost of books at all levels of education.

Supporting the above views, Otomiewo (2011) also outlined and discussed the challenges of provision of quality basic education in Nigeria as follows; inadequate Funding of the education sector, Qualified Teachers, Remuneration of teachers and Corruption.

Poor Funding

Funding of the basic level of education can be said to be neglected by the government at the Federal, State and Local levels because the National Policy on Education states that financing basic education should be the collective responsibility of these various tiers of Government. An analysis of the federal government's annual budget allocation to education revealed that the government is in the habit of allocating low amounts of money to the educational sector. This is very evident in the year 2000 in which the percentage budgetary allocation to education was set at 8.36%, it decreased to 7% in the year 2001. It then increased to 8% in 2002 and then decreased to 7% in 2003. It rose considerably to 12% in 2004 only to fall back to 11% in 2005 up until 2007. In 2008, 13% of the budget allocation was given to education. Although this is said to be the highest percentage given to the education sector which has been commended by some Nigerians, it is still a far cry from the 26% recommended by the United Nations Education, Scientific and Cultural Organization (UNESCO).

Inadequate infrastructural facilities

As a result of the limited resources in the education sector, the issues of inadequate infrastructure like classrooms and under paid teaching staff become issues of concern. Infrastructural facilities remain inadequate for coping with the rapidly growing number of children aspiring to go to school daily. The school environment is therefore generally not conducive for learning due to the physical condition of most schools. Most primary and secondary schools in Nigeria are in terrible condition with leaking roofs, cracked walls, no writing desks, no writing materials, no libraries, no laboratories, no furniture for teachers to sit on. Some schools even go to the extent of asking students to provide their own tables and writing materials knowing that most of the pupils are poor and cannot provide these amenities. The poor funding of basic education has also lead to the inadequate maintenance of existing facilities and has also slowed down the process of building new facilities which cannot keep up with the increased enrolment of children. This definitely leads to overcrowded classrooms which make it difficult for children to assimilate due to the uncomfortable nature of the classrooms. The National Policy on Education prescribes that the teacher-pupil ratio should be 1:40 but practically, a lot of primary schools have operated with teacher pupil ratio of 1: 80 and above which can affect the attainment of quality education and primary school Social Studies objectives.

Qualified Teachers

What constitutes the quality of primary school education is based significantly on the type of the teacher education programme available for preparing primary school teachers. Therefore one of the problems faced by the primary schools in Nigeria is the poor quality of teachers produced from the various teacher training colleges. The Nigerian Certificate in Education (NCE) is the minimum teaching qualification in Nigeria. This means that no primary school teacher in Nigeria is expected to possess any teaching qualification lower than the NCE. This could be regarded as a bold move in order to improve the quality of teachers who will be able to impart the type of education the Nigerian children need. It is reported that 23% of the over 400,000 teachers employed in the nations primary schools do not possess the Teachers grade Two Certificate even when the NCE is said to be the minimum educational requirement an individual should possess to teach in the nations primary schools. This is definitely a challenge because the difficulty in transferring knowledge from the so called "half baked" teachers becomes an issue. This undermines the purpose of the provision of basic education because the government needs to train the required number and improve the quality of teachers needed to successfully implement the provision of basic quality education.

Poor remuneration of Teachers

Teacher's salaries have always been a cause of concern in the education sector. It is a known fact that the issue of poor n the biggest motivation for teachers in recent times. Poor remuneration of teachers in the country has turned the teaching profession that used to be the envy of all into a profession of ridicule which youths are now skeptical of going into. Students no longer fancy education as a study course because the remuneration of public school teachers is poor. This situation impacts negatively on the smooth running of primary schools. The motivation and personal welfare of teachers as professionals can be described as very poor. It often takes the Nigerian Union of Teachers (NUT) some days of work boycott in order to get primary school teachers paid whenever there is a salary delay. This has certainly affected the effective performance and morale of the teachers which therefore lowers the quality of education that is being passed down to the children. On several occasion teachers in different parts of the country have demonstrated their displeasure concerning neglect of the government to the plight of the teachers by embarking on teachers strikes in order to make their intentions known. An example was the situation in Delta state where the Nigeria Union of Teachers (NUT) in Delta State directed primary school teachers in the State to embark on an indefinite strike, complaining of what they called the Governments nonchalant attitude towards their welfare.

The teachers strike began after an ultimatum given to the State Government of Delta State to improve the welfare of teachers had lapsed. Also the nonpayment of the increased salary of primary schoolteachers had not been met. Another recent strike incident occurred in Abuja, the Federal Capital Territory where Teachers boycotted their respective classroom because the teachers had not been paid the teachers monetization arrears which they been promised for six months. The remuneration of primary school teachers is very important in order to boost the motivation of teachers to effectively impart quality knowledge to the students. It is bad enough if teacher's salaries are said to be low, but when the low salaries are not paid on time or are left in arrears, it definitely agitates the teachers and dampens their morale to teach in the class rooms. It also affects the learners in the long run and there for eposes a huge challenge to the effective running of the Universal Basic Education Programme.

Conclusion

Since Primary education is the bedrock upon which all levels of education lies, it is imperative for emphasis on quality educational attainment because once the foundation(Primary School) is deficient all other levels of education after it to the University (tertiary levels) will be affected. In the light of the above, if the recommendations put forward in this paper are put into practice and implemented by the government, quality education and sustainable development can be attained as no nation can rise above the quality of its educational system.

Recommendations

Based on the above discussions, the following recommendations are made;

i. Teacher's welfare in terms of salaries and allowances should be paid promptly without delay by the constituted authorities.

ii. Special salary scale should be introduced by government for teachers in primary schools in Nigeria to enable them put in their best in inculcating the right type of attitudes and values for quality educational attainment and sustainable development in Nigeria
iii. Government should intensify efforts at all levels to improve on budgetary allocation to education sector as compared to the previous allocation that is far below UNESCO standard of 26% to enhance efficiency and teachers productivity for quality primary education to be attained
iv. Incentive should be giving to hardworking and performing teacher inform of motivation to enhance teachers performance for quality education and sustainable development in Nigeria
v. Quality control and assurance unit should be strengthened at all levels of education particularly at the primary school to ensure quality education and sustainable development
vi. Monitoring and evaluation of teachers should be giving priority attention to enable them put in their best in teaching and learning process in primary schools in Nigeria
vii. Teachers recruitment should be based on meritocracy rather than favoritism to ensure efficiency quality education and sustainable national development to prevail
viii. Conducive learning environment should be provided for the learners in primary school to motivate and sustain their interest for quality educational attainment

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YOUTH EMPOWERMENT FOR POVERTY AND UNEMPLOYMENT REDUCTION IN THE 21TH CENTURY FOR SUSTAINABLE NATIONAL DEVELOPMENT.

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Abstract

Poverty and unemployment are issues that affect national development which need to be addressed urgently by means of empowering the youth. The paper attempts some basic concepts clarification like youth empowerment, poverty, unemployment and sustainable national development. The paper also xrayed some problems of youth unemployment and poverty to include: high rate of crimes such as, kidnapping, thurgery and prostitution among the female as well as urban migration leading to housing congestion in the cities and environmental problems. The paper concludes that the high rate of insecurity in the country could be attributed to high level of poverty and unemployment that has permeated into the society without corresponding remedial measures: Consequently, the paper recommends that policy makers should try to encourage entrepreneurial education and vocational and technical education to be incorporated into school curriculum for self employment and as well as give self loan to students after graduation so that they can establish their own business and become an employer of labour rather than job seekers.

Key words: Youth Empowerment, Poverty, Unemployment and Sustainable Development.

Introduction

Empowerment is a commendatory term as it is socially appealing and suggests a way of gaining a capacity to effect a change. Poverty is an age long phenomenon that has bedeviled both human and societal image in one way and the other. Poverty is the evidence of the failure of modern societies to adopt social and economic strategies that will benefit the generality of Nigerian citizens, especially youths. Nigeria is richly endowed with both human and natural resources, yet it is caught in the cyclic web of poverty, unemployment, underemployment, and diseases (Ogbiji, Ode and Agida, 2013). Nigeria remains one of the poorest countries of the world today and still carries tag of developing nation, despite the fact that it is the 6th largest producer of crude oil in the world market. In a bid to eradicate poverty, the United Nations declared the year 1997-2006 for poverty eradication decade. Both national and international initiatives identify education as the answer to poverty eradication and youth empowerment. According to Nuhu and Yusuf (2011), Nigeria is among 192 countries that signed the Millennium Development Goals (MDGs) in September 2000 for attainment of the goals by the year 2015. The question is that could any of these goals such as eradication of extreme poverty and hunger, achieve universal primary education, promotion of gender equality and women empowerment, reduction of child mortality, combat HIV/AIDS, malaria and other diseases, ensure environmental sustainability and develop a global partnership for development be achieved by the year 2015 or a mirage? The answer to this question is that, "leaders that are people oriented, disciplined, not selected but elected, has respect and obedience to the civil society, and constituted authorities, respect for the rule of law, has regards for fundamental human rights, leaders that can lead but not rule, are able to give chance to the youth in governance by fulfilling promises need to emerge to reduce youth restiveness and ensure guarantees of life and properties for development in Nigeria.

The logic of empowerment seems to suggest that there is dissatisfaction, incapacitation and disempowerment, as well as absence of security of human rights and dignity (Daku, 2007). Youth empowerment is the central issue of development, particularly human resource development. Development needs to be powered through the youth as the critical agent because youth, according to Daku (2007) is a young man, fresh and vigorous occupying life between childhood and manhood.

Conceptual Clarification

Youths form the largest population among the young and the adult. Youth is just like the connecting link between the young and old people in our society. According to Daku (2007), the youths are the representatives of individuals with limited priority of life that can contribute significantly to the development of any nation economically, politically and socially. The youth constitute about 40% of human society, considering their strength numerically (Kalu, 2007).

The period of youth is the time of a particular intense discovery of human as well as the properties and capacities associated with it (Kalu, 2007). The period of youth is between the agesof 6-30 in Nigeria according to national planning. It is the period of complex change, rapid and physical change, development and intellectual change, mental alertness and a search for truth and meaning of life (NNYP in Kalu, 2007). Youth may also mean the stage of physical growth and psychological development through which individual human is built upon.

The Concept of Empowerment

The concept of empowerment is not an end in itself, but a means to an end (Daku, 2007) He maintain that it is the ability to do something and the process where there is a facilitator "Y", whereby a powerless "X" is made powerful or more powerful than going through "P" refers to empowerment. This is because empowerment has the seed of making persons independent, assertive and autonomous, as it gives the recipient the capacity and ability to be rational and more reflective in actions.

Daku (2007) sees empowerment as expansion of assets and capabilities of the poor people to influence, control, participate in, negotiate with, and hold accountable institutions that affect their lives. It is also the process of strengthening the existing capacities and capabilities of the deprived groups (youths). Empowerment enables groups or youths to perform better by improving themselves, families and the nation or country at large. Empowerment according to Ogbiji, Ode and Agida (2013), is a process of acquiring, providing, bestowing the resources and the means of access to and control over such resources and means. This implies that an individual has the potential to acquire power through his or her initiatives and as well can have power through another person or party. It is also a process of awareness of capacity building resulting to greater participation, decision making, and control of power to transformative action. This is because empowerment makes an individual, especially the youth to gain insight and awareness of what is unfavorable, undesirable about their current situation and to perceive a better situation on the possibility of attaining and realizing what is within their reach and what to do for the betterment of the society, and development of nations.

In an attempt to empower youths in Anambra State, Governor Peter Obi of Anambra State presented cheque of N100,000.00 each to about 506 beneficiaries after two weeks character/vocational skills acquisition training programme (Onuchukwu, 2014). This is part of measures of tackling unemployment in Anambra State and empowers the youth. This is because about 5000 youths have benefited from the programme since inception in 2010.

National Development

Development needs to be clarified before explaining what national development is. Therefore, development is a process of establishing people to accomplish things they could not do before. This means learn to apply information, values, attitudes and skills previously unavailable to a nation. According to Daku (2007) states that development is a process in which a system is transformed into stronger, more organized, more efficient and effective form and human wants and aspirations proves to be more satisfying. Kalu (2007) equally defined development as "the transitional process of sustaining multifaceted improvement in human condition leading to positive structural and functional changes in social, political, economic, scientific, and all aspects of human endeavors.

From the foregoing, national development can be defined as a planned and sustained growth which moves a nation from its present status to preferred level i.e. moving from mass poverty, unemployment, poor infrastructure, and frustration that goes with underdevelopment. Economic growth, socio-political, economic and educational variables all support national development just like what the various government of Nigeria since 1962 have been trying to achieve.

Unemployment

Unemployment in economic sense is a condition that exists in an economy when able bodied men and qualified persons willing to work cannot find productive and paid job to earn their living (Musa & Ibrahim, 2011). Unemployment is a justification of human resource wastage because it encompasses under-utilization or miss-utilization and non utilization of a good number of employable people in any nation. This implies that people that are qualified and active to work are unsuccessfully engaged in working for a living.

Sustainable Development

Sustainable development according to Haruna & Abdullahi (2011) is a process of change by which the exploitation of natural resources and creation of technological development are in harmony. It encompasses all round growth and focuses on the developing nation on how they can achieve awareness, develop skills, attitudes and abilities that can empower them to harness the natural resources of their environment efficiently and effectively in a sustainable manner in such a way that the quality of lives of both the present and future generations will be ensured. According to Oladosu (2014), sustainable development means gradual process of growth towards an advanced stage in a continuous manner. In another dimension, Oladosu (2014) assert that sustainable development addresses four major obstacle faced by states in their efforts at maximizing the welfare of their people by:

i. Achieving competiveness in a diversified economy.
ii. Refocusing agriculture to remove hunger.
iii. Reducing the gap of inequality and poverty among citizens.
iv. Promoting peaceful co-existence among its citizens.

Therefore sustainable development is possible if the state is able to attain the above conditions and continuously withstand the stress that tends to undermine its development. Development according to Haruna & Abdullahi (2011) is the improvement and ability of a society to influence the environment economically, politically, socially, culturally and technologically for the advancement of living condition and wellbeing of the generality of the society.

Concept of Poverty

Poverty as a menace has no universally accepted definition. It depends on the parameter or dimension one perceives or views it. Maduagwu (2000) opined that poverty makes people to compromise moral values and forget it completely. This is because poverty causes corruption and corruption is an effect of poverty and loss of moral values. Poverty according to Oxford Learners Dictionary 6th edition in Haruna and Abdullahi (2012), poverty is a state of being poor, having little money, not having at all, and not able to get the necessities of life.Poverty is also defined as the scarcity of human basic needs and inability of individual society to acquire human basic needs for existence (Haruna and Abdullahu, 2012). It is inability of people to discharge their basic responsibilities. This is because poverty exists only when people lack the means of satisfying their basic needs.

Poverty according toUdoh and Ukpong (2013) is manifested in poverty history, intellect and ideology. This is because the people that are deprived of basic needs are regarded as the poor in the society.Poverty is also conceptualized as the state of human beings having little or no material means of living a comfortable life due to exploitation of the poor by the rich, bad government, and lack of individual responsibilities leading to crime and violence. Poverty as a pathetic life situation by which people lives from hand to mouth finding it difficult to eat three square meals a day.

Successive Governments efforts towards Youth Empowerment, Poverty and Unemployment Reduction in Nigeria since 1972 till date

Successivegovernments administration in Nigeria has initiated various poverty alleviation programmes aiming towards national development. The first poverty alleviation programmes in 1972 under General Yakubu Gowan's administration were National Food Production Programme (NAFPP) and the Nigeria Agricultural and Cooperative Bank (NACB) aimed at boosting food production and unemployment, but the effort was not fully achieved due to corrupt officials. This is justified from the investigation panel that found all the governors under Gowan's administration guilty of corrupt enrichment and assets worth more than 10 million naira confiscated. More than two thousand public officials were also indicted according to Akpotor in Edimeh (2007).

On assumption of office in 1976, General Murtala Ramat Muhammed after seizing power from Gowon left no one in doubt about getting rid of corruption in Nigeria, as many corrupt officials were relieved of their jobs, but unfortunately the regime was short lived as a result of Murtala's assassination; which led to excessive increaseof corruption by public officials that were massively dismissed. General Obasanjo took over power in 1976, after the demise of his boss (Murtala) and continued with Jaji declaration to wage war against corruption, but the irreversible cankerworm continued to exist among officials under his regime before handing over power to democratically elected president Shehu Shagari in 1979. The level of corruption greatly increased in Nigeria through inflation of contracts, embezzlement of public funds, ghost workers syndrome, senseless importation and abandoned projects among others. Accordingto Haruna (2007), effort was made to avert corruption and reduce poverty by introducing ethical revolution in 1982 to re-orientate Nigerians on the culture of greed, graft, patience, discipline and avarice to one of probity and accountability. All these efforts during this administration as a result of corrupt governors proved abortive as all governors except Balarabe Musa were found guilty of corruption. Victor Masi, the finance minister then embezzled N15.3 million, Nigeria was duped of N15 billion through wheat importation, Alhaji Umaru Dikko was notorious for office abuse, £16.2 billion was siphoned to England through the JMB affair (Edimeh, 2007), and projects were abandoned littering the national development all of which made the ethical revolution a mere lip service and led to the overthrown of the government in a coup led by General Muhammadu Buhari.

General Buhari launched War Against Indiscipline (WAI) to cub corruption, and introduced back to land in 1984 to alleviate poverty and hunger. The regime was actually tough on corruption in public service, disorderliness, smuggling and drug trafficking, but lack monitoring and supervision to achieve results. This made an officer to smuggle a huge amount of money under military escort but the identity was withheld due to lack of transparency.

Gen. Babangida introduced Mass Mobilization for Social Justice and Economic Recovery (MAMSER), Directorate for Food and Rural Infrastructure (DFRRI), NACB, and Community Banks in 1986 to reduce poverty and unemployment for development of the Nigeria, and his wife also introduced better life for rural women programme to augment the effort of her husband in alleviating poverty, but has the shortcoming of corrupt officials under his regime.

Late General Sani Abacha introduced Family Economic Advancement Programme (FEAP) in 1993 and National Directorate of Employment with the aim of reducing poverty and unemployment challenges facing Nigeria, and the wife also supported the programme with Family Support Programme (FSP), and National Directorate of Employment (NDE) which seem to have recorded remarkable achievements in terms of youths skill acquisition training and self-employment. Though these programmes has been insignificant, as a result of poor funding, poor coordination, mismanagement, lack of transparency, as well as inadequate target of potential beneficiaries. War Against Indiscipline and Corruption (WAIC) was introduced to checkmate corruption but to no avail.

Obasanjo led administration in 1999-2007 introduced several poverty and unemployment reduction programmes such as National Poverty Eradication Programme (NAPEP), Nation Economic Empowerment and Development Strategy (NEEDS), aimed at re-orientating values, wealth creation, employment generation and poverty reduction. Alongside the aforementioned poverty and unemployment reduction programmes, Nigeria adopted global means of reducing poverty which is Millennium Development Goals (MDGs), which has the goal number one as poverty reduction, hunger and unemployment by the year 2015. The increasing level of poverty and unemployment in the country is a sign of the programme's failure as well, despite the introduction of EFCC and ICPC to checkmate activities of corrupt officials.

Factors Responsible for Poverty and Unemployment in Nigeria

In Nigeria, there are several factors that account for high rate of poverty and unemployment. The two concepts go hand in hand as poverty is a product of unemployment, one factor leads to the other. According to Nuhu and Yusuf (2011), causes of poverty and unemployment in Nigeria are ill-planned system of education, rapid population growth, the pursuit of inappropriate government policies and programmes, neglect of entrepreneurial education, non-mechanization of agriculture, imperfect information, rural-urban migration, low capacity utilization, hostile economic environment among others.

Haruna (2014) also maintained that lack of continuity of government policies and programmes, corrupt or bad governance, over population, lack of self-discovery, privatization and commercialization of public enterprise, quest for white collar jobs, high salaries and allowances for political office holders, lack of proper supervision among others can lead to poverty and unemployment in Nigeria and it affects development of nations.

In another related development, Opara and Ugwuadu (2013) states that growth rate of poverty in Nigeria is as a result of such factors among others as production factors, income distribution, economic, governance problem (corruption), inter sensorial factors, gender factor and social conflict factors. In the same light, Adaji and Dasuma (2011) assert that imbalance created by colonial administration and post-independence leaders, high population growth, low productivity and corruption are causes of poverty and unemployment in Nigeria. In the views of Onoja and Zakari (2011), causes of poverty and unemployment in Nigeria is attributed to corruption and embezzlement, excessive external debt burden, rapid population growth, lack of comprehensive national poverty alleviation policy, poor leadership and lack of sound agricultural policy and protracted neglect of the sector.

Idoko and Agenyi (2011) opined that poverty in Nigeria is caused by lack of basic services, lack of assets, lack of access to means of supportive rural development in poor areas, inadequate access to market and lack of access to employment opportunities.From the foregoing analysis of various causes of poverty, and unemployment in Nigeria, permit us to discuss some of the points highlighted at this juncture.

One of the major causes of poverty and unemployment in Nigeria is high rate of population estimated at about 2.83%. While the Gross Domestic Product is only 2.7%, which affects the living standard of people. People marry and give birth any how without considering the implications on the development of Nigerian economy.

Lack of self-discovery among individuals is equally responsible for poverty and unemployment in Nigeria. Some people have potentials in them that will make them self-reliant and become self-employed, thereby reducing poverty and unemployment in the society.

Privatization and commercialization also causes poverty and unemployment in our society. For instance, Adugbo (2013) stated that Nigeria, Africa's largest producer, plans to begin privatizing its four state owned oil refineries before the end of the first quarter of 2015, according to petroleum minister, Diezani Alison Madueke. Workers that are gainfully employed in the oil sector will face unemployment and consequently may lead to poverty as they may be relieved of their appointments.

Demand for white collar job by young graduates is yet another cause of poverty and unemployment in Nigeria; most of our graduates today only depend largely on government works without discovering the potentials in them to be self-employed, and even become an employer of labour to alleviate themselves from poverty and unemployment.

Finally, lack of comprehensive poverty alleviation policies is also responsible for high rate of poverty and unemployment in Nigeria. In this case, government policies like embargo on employment, retrenchment of workers, federal character and quota system, state of origin and lack of proper planning for the targeted group of beneficiaries who are the poor and unemployed youths are responsible for poverty and unemployment in Nigeria.

Consequences of Poverty and Youth Unemployment in Nigeria

The consequences or implications of poverty and unemployment in Nigeria are enormous which can be observed clearly in our society Nigeria. Some of the implications of poverty and unemployment are x-rayed as follows:-

One of the consequences of poverty and unemployment is breakdown of law and order. According to Adeoluwa (2013), insecurity in Nigeria today have always been put at the door step of poverty and unemployment, porous borders, corrupt officials, poor funding of agencies. Since a hungry man, they say is an angry man, he maintain that the poor youths who are unemployed could not obey the rules and regulations governing them and the society, rather they compensate themselves with dubious means of survival like cultism, terrorism, kidnapping, political thugry, and 419 to mention but just a few disturbing the development of nations, economically, politically and socially. Elucidating further, Onojo and Adaji (2011) stated that the growing scale of poverty and unemployment in Nigeria has created an avalanche of available non elites who are hirable to commit arson, assassinations, general mayhem, and stealing of ballot boxes.

Another great consequence of poverty and unemployment is crime. The rate of crime in the country is quite alarming. Incidences of rubbery, drug trafficking, human trafficking, militants in the Niger Delta and Boko-Haram in the North Eastern part of Nigeria are all attributed to poverty and unemployment among youths in particular.

More so, the image of the country in the international arena is sadly enough. Nigeria has been given various negative labels such as terrorist country, center of kidnapping, corrupt nation and above all, the center of criminal behavior (Abekhale and Antyo, 2013). In international scene, Nigerians are seen with suspicion as they are considered dishonest, corrupt, fraudulent and destructive. All these labels have reduced the reputation and image that was accorded to Nigeria as a nation. It is embarrassing to obtain a visa to travel abroad as a Nigerian, as it requires serious interviews. For one to address himself as a Nigerian abroad, it takes courage because he may be called some derogatory names, and as a result of these attitudes that are negative, it is quite unfortunate as Nigerians may no longer attract friends and foreign investors into the country.

In addition, ethnic and religious crises in some parts of the country are largely attributed to unemployment and poverty because an idle mind they say is the devil’s workshop.Similarly, poverty and unemployment could render government policies ineffective, weaken the basis for growth and development and consequently make the system to collapse.

Corruption is yet another implication of poverty and unemployment. Corruption weakens the political systems and renders the basic principles of democracy and governance impotent. For instance in many cases, corruption is induced directly or indirectly by sheer pressure of poverty and greed to escape poverty in future. According to Adaji and Dasuma (2011), Nigeria has received over $300 billion in oil revenue alone over 25 years, and this is enough to bid poverty farewell, but owing to issue of corruption that infiltrates in both low and high places, laudable programmes and policies of the government when frustrated, hinders national development.

Finally, socio-economic and political development of a country cannot be attained without youth empowerment when faced with poverty and unemployment. Therefore, poverty and unemployment hinders growth and development of any nation in terms of scientific, political and socio-economic activities of any nation like Nigeria, since the youth constitute majority of the working class.

Conclusion

This paper examines the concept of poverty, empowerment, national development, sustainable development, causes of poverty and unemployment in Nigeria. It further discuss some consequences and implications of poverty and unemployment in Nigerian society and finally recommends that proper funding and monitoring should be emphasized by the government at all levels to ensure success of poverty reduction and unemployment challenges. Poverty and unemployment can be minimized or reduced but cannot be totally eradicated in any nation, be it developed or developing nation because in any society, there is clear distinction among individuals; for all hands cannot be equal.

Recommendations

It is pertinent at this juncture, that there is no governance without the governed. Leadership connotes followership and one may really not be able to divest one from the other. It is reasonable to argue that leaders are selected or elected from among followers, and that every society deserves the kind of leaders it gets (Adeoluwa, 2013).Youths suffer a lot of deprivation which militate against their positive contribution towards national development. Therefore the youth need to be empowered to achieve poverty and unemployment reduction in Nigeria for development of the nation politically, socially and economically abiding by the following recommendations:-

i. The unemployed youth in every society should be identified and made to benefit from the targeted policies such as education, health care, crime prevention, power supply and housing.
ii. Non-governmental organizations should work closely with the poor youth by making them to act as watchdog on various activities sponsored by the government on poverty and unemployment reduction.
iii. Adequate funding of policies and programmes targeted towards youth empowerment and poverty reduction should be provided to ministries that overseas such policies at various levels and be properly monitored to ensure success.
iv. They key causes underlying determinants of extreme poverty and unemployment need to be mapped out by individuals, society, region, gender and the nation at large because a problem known is a problem half solved.
v. Poverty and unemployment can be reduced if corruption is tackled in all ramifications. The EFCC (Economic and Financial Crimes Commission) should punish any official who thwart the efforts of the government in the policy of youth empowerment and poverty alleviation rather than been used being to hunt political opponent irrespective of one’s position or status
vi. Furthermore, our educational system in terms of its curriculum should be restructured to make it easily adaptable and flexible to the ever changing societal needs. The educational system should comprise of vocational, entrepreneurial and professional training to prepare youth for self-employment and self-reliance in order to overcome poverty and unemployment in Nigeria for national development.
vii. Finally, over bloated salaries and allowances of political office holders should be reviewed for redistribution of income among the citizens and politicians should be advised to save in Nigerian Banks rather than foreign account to minimize corruption and invest in Nigeria to reduce poverty and unemployment which in turn leads to development of nations.

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CRITICAL PERSPECTIVE ON SOCIAL STUDIES EDUCATION CURRICULUM IN NIGERIA: PROBLEMS AND PROSPECTS

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Abstract
Social studies is a core-subject offered in Junior Secondary School educational system in Nigeria. This paper therefore examines various contending issues in social studies education curriculum. The definitions of relevant terms such as, Social studies education curriculum and social studies were given. Historical perspectives of social studies education, objectives of social studies curriculum and implementation issues as it affects social studies curriculum in Nigeria were discussed. The problems and prospects of social studies were enumerated. However, recommendations were made in line with the belief of the paper.

KEY WORDS: Perspective, Social Studies Education, Curriculum Problems, Prospects

Introduction

One of the critical perspectives on social studies education curriculum in Nigeria is curriculum implementation. There is the need to overhaul the implementation issues in social studies curriculum in Nigeria with a view to improve upon its execution in order to achieve the desired goals as demanded by the National Policy on Education. The National Policy on Education (2004) viewed education in Nigeria of which social studies curriculum is core as an instrument, par excellence, for effecting national values and total development. According to Adralegbe (1980), in Umar (2007), social studies education curriculum is a problem – approach discipline through which man learns about problems of survival in his environment. It is seen as a veritable tool for inculcating appropriate values, attitudes, skills and knowledge in citizens so that they can be functional and responsible. Okam (2002), regarded social studies as a curriculum instrument for inculcating citizenship norms- building. Many empirical studies reveal that we are yet to attain this goal. In other words the Nigerian populace, through their school systems, is yet to effectively achieve the desired ends that promoted the introduction and teaching of social studies in the country. The lapses are not entirely inherent in policy formulation as in National Policy on Education but on the implementation issues as will be considered in this paper.

Concept of Social Studies

Social studies is a reformatory school instruction designed to equip learners with desirable attitudes, values, skills and knowledge for cohesive social existence in Nigerian society (Mezieobi, 2011). Social studies education is the science of doing or making (creative ideas, social inventions and objects) that will enable man interact with (and contribute productively to his) environment (development) efficiently (Orisa, 2011). As cited by Ezezobor (2000), social studies is that aspect of learning which deals with how to get on with ones environment, physical as well as human and how to develop these skills, knowledge, attitudes and values that characterize a respective and responsive citizenship in a free society. Social studies is the study of problems of survival in an environment and how to find solutions to them. It is a multidisciplinary study of topic, a problem an issue, a concern or an aspiration (Ogundare, 2000).

Social studies is defined by Garcia and Micheals (1996), as the integrated study of the social sciences and humanities to promote civic competence. Within the school programmes, social studies provides co-coordinated, systematic study drawing upon such disciplines as anthropology, archeology, economics, geography, history, law, political science, religion etc as well as appreciate content from the humanities, mathematics and natural science. The primary purpose of social studies is to help young people develop the ability to make informed and reasoned decisions for the public good as citizens of a culturally diverse democratic society in an inter-dependent world. Based on the above authors, the first author looked at social studies as an instructional process through which values and attitudes are instilled in the mind of citizens. The second definition sees it as an idea that will help an individual to become productive member in the society. The third one added some things on the first definition where social studies is considered as a guide to discover societal problems and provide possible solutions to those problems. While the last one sees social studies as an integrated design that covers different ideas from different disciplines.

Historical Development of Social Studies in Nigeria

There are different narrations on whether social studies was imported to Nigeria from Britain or America. Social studies emerged in Nigerian schools at the early 1960s (Ezegbe1987). Social studies existed in bits in various Nigerian school subjects such as history, civics, government and other social sciences. This trend continued up to the middle of 20th century. According to Ayuba (2009), social studies appeared in some schools in Nigeria with the assistance of United States Agency of International Development (USAID) in Aiyetoro Comprehensive College, Ibadan. From there social studies continued in various schools despite the consequences of civil war in the 1960s which proved the importance of education, loyalty, honesty, patriotism to the teaming population. The institution of higher learning and universities helped in the production of personnel (teachers) in the implementation of social studies curriculum in various strata of the education. For instance Ahmadu Bello University Zaria has contributed in the production of Bachelor of Education Graduates of social studies needed in primary and secondary schools in the country. The Federal Republic of Nigeria (2004), provides an impetus which adopted social studies as a compulsory subject in primary and junior secondary and primary schools in Nigeria.

Objectives of Social Studies

The general objectives of social studies education as an academic discipline according to Dubey& Barth (1980), and Obemata (1983), should aim at achieving the following:

1. Exposing the diverse and ever changing physical and social environment as a whole including its natural resources, together with the rational use and conservation of these resources for development;
2. Developing in the learners, the capacity to learn and acquire skills including not only the basic skills of listening, speaking, reading and writing but also of developing the skills of creativity together with those of analysis and inference which are important in the formation of sound judgment;
3. Developing in children, positive and desirable values of citizenship and the desires in them to make positive contribution to the creation of a united Nigeria; and
4. Inculcating in the learners sympathetic views which will enable them to appreciate the diversity and interdependence of all members of the local community and of the wider national and international community.

Social Studies Objectives for Junior Secondary school Programme

There are a number of objectives as it relates to the teaching and learning of social studies. The objectives of social studies for post-primary education according to Okonkwo (2009), are to:

1. make the students aware of the problems of his country and of the world in general, and to appreciate interdependence between people;
2. create an awareness and understanding of the evolving social and physical environment, its natural, man-made, cultural and spiritual resources together with the rational use and conservation of these resources for development;
3. develop in the students a positive attitude to citizenship and a desire in them to make a positive personal contribution to the creation of a united Nigeria;
4. develop a capacity to learn and to acquire skills essentials to the formation of a satisfactory professional;
5. develop in the student an appreciation of his cultural heritage, and a desire to preserve it;
6. acquisition, development and inculcation of the proper value-orientation for the survival of the individual and society; and
7. acquisition of both physical and intellectual skills which will enable individuals to develop into useful members of the community.

National Policy on Education and Social Studies Objectives

The aims of Social Studies in the Nigerian education system is consistent with the goals of Nigeria's education as stipulated in the Federal Republic of Nigeria National Policy on Education (2009). These include:

1. inculcation of national consciousness and national unity;
2. inculcation of the right type of values and attitudes for the survival of the individual and the Nigerian society;
3. training of the mind in the understanding of the world around; and
4. acquisition of appropriate skills, abilities and the development of mental, physical and social skills and competencies as equipment for the individual to live in and continue to the development of the society.

These objectives in many respects reflect in greater details the four educational pillars enunciated by UNESCO (1998), namely: learning to know, learning to do, learning to be and learning to live together. So, social studies as a discipline helps in achieving the above goals.

Concept of Curriculum

Curriculum is defined by Indiana Department of Education (2010), as the planned interaction of pupils with instructional content, materials, resources, and processes for evaluating the attainment of educational objectives. According to (Coles, 2003), a curriculum is a policy statement about a piece of education as a way to indicate the way in which policy is to be realized through a program of action. Denga (2005), viewed curriculum as the planned and unplanned experiences to which learners are exposed to within and outside the school environment for individual and collective growth. Curriculum according to Onwuka (1996), can be viewed from two viewpoints: The traditionalists and progressives viewpoints. According to the traditionalist, the curriculum is simply a subject matter, courses of study or planned experiences of the learners under the guidance of the school. The progressives view the curriculum as the guided learning experiences centered around the felt needs of the learners. In other words, it is all the planned and unplanned learning experiences which may be implemented in or out of school but bear direct relevance to education. Considering Onwukas' definition, in whatever form the term curriculum is presented must fall in either traditionalists or progressive perspective.

Problems of Implementation of Social Studies Curriculum

There are the general obstacles to the implementation of social studies curriculum in Nigeria. Problem of definitions: Social studies as a subject, has no universally accepted definition since its inception in America in 1916. Teacher Education: Inadequate social studies teachers at all levels of education constitute serious problems in the education system. The preparation of social studies teachers is also substandard:

i. Content Selection: Barr, Barth Sharms in Danladi came up with three traditions in social studies. These are social studies as (a) citizenship education (b) Social science (c) Reflective inquiry. Teachers tend to select their teaching contents based on their own traditions then problem arises.

ii. Problem of Method: Most social studies teachers are still friendly with traditional/expository methods at the expense of experimental/inquiry methods which could have helped in achieving the objectives of socials studies as demanded in the National Policy on Education.

iii. Inadequacy of suitable social studies textbooks written by the experts in the field.

iv. Teaching aids were grossly inadequate in Nigerian schools and the available ones are not used by the teachers.

v. Degrading Societal Value: The value system is gradually breaking down in our society. Most people value money more than hard work and this is contrary to ideals of social studies.

Prospects of Social Studies Education

If the implementation issues in social studies curriculum are resolved adequately, the subject has the ability to develop in Nigerians positive values, attitudes, skills and knowledge necessary for the survival of citizens and the society ingeneral. It is hoped that socials studies education will inculcate in the citizens high moral standard, social understanding, togetherness, love, respect, tolerance, positive national values, dignity of labour, national consciousness and national unity. Okobiah(2004) agreed that social studies curriculum is designed to inculcate in the masses desirable social habits and attitude as well as acquire useful manipulative skills of solving the emerging problems in the society. The prospect of social studies curriculum is predicated upon its capability of presenting partial or even total solutions to multidimensional trafficking, corruption, money laundering, religious and ethnic confrontation, HIV/AIDS scourge, terrorism, poverty and hunger.

Conclusion

The paper has discussed the implementation issues as it affects social studiescurriculum. Time has come when lip-service should no more be paid to the implementation issues of social studies curriculum in Nigeria both in the areas of quality and quantity of teachers funding, Information Technology demands, qualities and quantities of students entrants and the issue of multi-ethnic realities. It should be noted that these issues can be easily addressed through social studies curriculum content for building a virile and democratic culture for the progress of the nation and for the well being of all citizens.

Recommendations

In the light of implementing social studies curriculum for the benefits of allcitizens and Nigeria as a whole, the following recommendations are made:

1) Teaching of social; studies in our schools colleges and universities should be exclusively reserved for graduates of social studies education who have a track of record of excellence.

2) There should be adequate funding of education in general and social studies curriculum in particular in the area of provision of workshops, internet service, libraries, teaching aids and adequate textbooks.
3) Social studies teacher should be computer literate in order to cope with the challenges of Information Technology and Globalization.
4) Only those that meet up with the national commission on Colleges of Education and National University Commission guidelines should always be givenadmission to study social studies in Nigerian schools.
5) All Nigerians should have value re-orientation and think of Nigeria and the national values above all other considerations.

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EFFECTS OF COMPUTER DRILL, PRACTICE AND DEMONSTRATION STRATEGY ON JUNIOR SECONDARY SCHOOL STUDENTS' BASIC SCIENCE ACHIEVEMENT IN ABUJA

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Abstract
The study investigated the "Effects of Computer Drill, Practice and Demonstration Strategy on Junior Secondary School Students Basic Science Achievement in Abuja. The study adopted a 3x2x2 pre-test, posttest non randomized non-equivalent group factorial research design. A purposive sampling technique was employ to select three schools in Abuja Municipal Area Council (AMAC) 220 (38 male and 44 female), (28 male and 48 female), (28 male and 34 female) were selected as sample for both experimental group and control group respectively. Computer, drill and practice instructional package and Basic science Achievement test were used as Data Collection Instruments. Three research questions and three corresponding hypotheses were raised to guide the study. The hypotheses were tested at 00.5 level of significant. The statistical analysis were done using Analysis of variance (ANOVA), Descriptive statistics, Analysis of Covariance (ANCOVA), Shefes Post hoc and independent t- test. The major findings was that students taught Basic science using computer drill and Practice perform significantly better than those taught with demonstration strategy and those taught with demonstration strategy performed better than those taught with the conventional method. There is no significant difference in the mean achievement score of male and female students taught Basic Science using computer drill, practice and those taught with demonstration strategy. Based on the findings, it was recommended among others that computer drill, Practice and demonstration strategy were effective for Basic Science teaching and should be used to complement the teaching of Basic Science to improve the achievement of students.

Keywords: Computer Drill and practice, Demonstration Strategy, Basic Science, Achievement, Students

Introduction

The essence of education is to transfer the culture of the society to the learners and one of the means in which this can be achieved is through the curriculum (Momoh, 2017). Ajileye (2015) asserted that due to the dynamic nature of the society and the changes that takes place especially in the teaching and learning of content, instructional method, resources and evaluation procedures there is need to accept Information and Communication Technology in education to supplement the traditional method of teaching which is usually teacher center for effective teaching and learning (Sayan, 2015)

Therefore, the Application of Information and Communication Technology in the school curriculum is one of the novelty and reforms in National Policy on Education (Olugbumi,2013) Thus, introducing computer drill, practice and demonstration strategy by stake holders in education becomes the only means of improving the curriculum at all level of education especially when it is employed in teaching Basic Science in Junior Secondary Schools (Arilegere, 2012).

Basic Science is one of the core subject offered at the upper basic education level (JSSI-JSS3) which provide students with appropriate experiences in science and technology in order to achieve the objectives of the science and technology curriculum (NPE, 2014) through scientific enquiry, exploration and acquiring manipulative skill. Based on the aforementioned significance of the subject, Basic Science has gained sound footing in the junior secondary school curriculum (FRN, 2004). Therefore, to improve on the achievements of students, with emphases on content, instructional strategy for effective teaching and learning of Basic Science at the Junior Secondary School level of education there is need to embrace technology in the school curriculum especially in the teaching of content. Instructional strategy such as Computer Drill, Practice and Demonstration Strategies may be effective instructional technology that can be employ to enhance student's achievement especially in primary and secondary education.

Computer Drill and Practice mode is one of the new innovative and strategy of teaching. It is an instructional strategies and a self-teaching method whereby learners are presented with small units of lesson hierarchically and where they are expected to reply to items presented in an orderly step. After each step, there are evaluated to test their understanding (Lee, 2004).

Demonstration strategy as one of the traditional teaching method can also be employed to improve student's achievement. Demonstration strategy is used to tell or explain the way things work and to help student to be conversant with the way equipment and apparatus are used (Uzuoma,2005) In view of the above, Isa (2007) stated that this teaching strategy enables students to interact and become familiar with objects and phenomena which will lead to a better achievement on the concept taught (Umuavbi & Mammudu,(2009). Achievement is viewed as learning outcomes among Basic Science students which is exemplified in their performances in school subject as symbolized by a score in a test (Noble, 2013).

Despite the efforts put in teaching Basic Science at the junior secondary school level especially in FCT (AMAC), there are a lot of factors affecting the teaching and learning of Basic Science which has been identified by Kent and Taylor (2016) as poor learning environment, Poor instructional delivery, lack of instructional materials, and poor method of teaching among others. Also students inability to retain learned concept as well as gender disparity constitute a serious problem in teaching and learning especially when this subjects are taught abstractly without using instructional materials that could help illustrate the content of the lesson (Ajai, & Imoko, 2015).

In view of the foregoing, the search for a better method of teaching Basic Science concept becomes important and interactive strategies considered by this study in putting to an end this present trend of poor achievement is the use of Computer drill, practice and Demonstration strategy to find out which one that will have more positive effect in teaching and learning. it is against this backdrop that the researcher investigate the effects of computer drill, practice and demonstration strategy on Junior Secondary School students' Basic Science Achievement in Abuja.

Aim and Objectives of the Study

The aim of this study was to investigate the "Effects of Computer Drill, Practice and Demonstration Strategy on Junior Secondary School Students Basic Science Achievement in Abuja. Specifically, the study objectives are to:

1. determine the difference in the mean achievement of junior secondary school students taught Basic Science concept using Computer drill, practice, Demonstration strategy and conventional Method.
2. find out the influence of gender on the achievement of students taught Basic Science concept with Computer Drill and Practice.
3. determined the influence of gender on the achievement of students taught Basic Science concept with Demonstration Strategy.

Research Questions

1. Is there any difference in the mean achievement of junior secondary school students taught Basic science using Computer Drill and practice, Demonstration method and those taught using conventional method in Abuja Municipal Area Council, FCT?
2. Is there any difference in the mean achievement scores of male and female students taught Basic Science using Computer drill, practice in Abuja Municipal Area Council, FCT?
3. Is there any difference in the mean achievement scores of male and female students taught Basic Science using Demonstration method in Abuja Municipal Area Council, FCT?

Research Hypotheses

1. There is no significant difference in the academic achievement of junior secondary school students taught Basic science using Computer Drill and practice, Demonstration method and .those taught using conventional method in Abuja Municipal Area Council, FCT.
2. There is no significant difference in the mean achievement scores of male and female students taught Basic Science using Computer drill, practice in Abuja Municipal Area Council, FCT.
3. There is no significant difference in the mean achievement scores of male and female students taught Basic Science using Demonstration method in Abuja Municipal Area Council, FCT.

Research Methodology

The study employed quasi- experimental design. 220 students were randomly sampled from a total population of 7,782 in Abuja Municipal Area Council during 2018/2019 academic session. The target population comprised Junior Secondary School I= students. The choice of JSS II classes as the target was based on the fact that they already had background knowledge of Basics Science in JS 1 and the concept taught fell under their syllabus and scheme of work. A purposive sampling technique was adopted to select three co-educational junior secondary schools in Abuja Municipal Area Councils (AMAC). These schools were Junior Secondary School Airport Road, Gosa and Lugbe. The reason for purposively selecting three schools was the availability of computer facilities, electricity and other ICT facilities. The three schools selected were randomly assigned into Experimental Group I (Computer Drill and practice mode) Experimental Group II (Demonstration Strategy) and control group (Conventional Lecture Method) respectively using simple random sampling.

The instrument used for this study was Treatment Instrument (Computer drill and practice mode) and Test Instrument (Basic science Achievement Test) The computer drill and practice mode instructional package was validation by experts in Education Technology, one Senior Lecturer in the Department of Science Education (Educational Technologist) Federal University of Technology (FUT) Minna. The BSAT was also validated by two Basics Science teacher in FCT Junior Secondary School and one Senior Lecturer in the Department of Science Education, Federal University of Technology (FUT), Minna. The BSAT consisted of two sections, A an B. Section A sought the demographic data of students. While section B was designed to take care of information on students' cognitive level based on what they were taught.

The data were analyzed using analysis of variance (ANOVA) and descriptive statistics. Analysis of Covariance (ANCOVA) and independence t-test statistics were used to test the hypotheses using Statistical Package for Social Sciences (SPSS version 2.0) at the 0.05 significance. Where there was a difference, Scheffes post hoc was used to determine where the differences lies.

Result and Discussion

The table below shows the outcome of the analysis of data collected

4.1 Summary of the ANOVA Comparison of the Pre-test Mean Achievement Scores of Experimental and Control Groups

Groups	Sum of squares	Df	Mean square	F	Sig.
Between groups	1390.704	2	695.352	6.727	.001
Within Groups	22431.455	217	103.371		
Total	23822.159	219			

*: Significant at 0.05 level.

Tables 4.1 show the ANOVA comparison of pretest scores of Experimental 1 Experimental II and control groups. An examination of the table shows significant difference between the mean achievement scores of the three group ($f_{(2,217)}$ =6.73, $p< 0.005$). hence, Analysis of covariance was used to adjust scores on dependent variables for initial differences on other variables find as pre-test achievement scores.

Table 4.2 Mean Gain of Achievement Score of Experimental I, II and Control Group

Group	N	Pre-test Mean($\bar{X}$)	SD	Post-test Mean ($\bar{X}$)	SD	Mean Gain Score
Experimental 1	82	36.87	10.39	74.41	7.49	37.54
Experimental II	76	42.76	10.46	85.14	6.62	42.38
Control	62	40.35	9.48	70.05	5.68	29.70

Table 4.2 shows the mean and standard deviation of pre-test, post test scores and mean gain of all the three groups of observed in the achievement scores of the students. Experimental group II had the highest mean gain score of 42.38, followed by Experimental group 1 with mean gain of scores 37.54 while the control group had a mean gain score of 29.70.

Hypothesis One ($H0_1$)

There is no significant difference between the mean achievement scores of Junior secondary school students taught basic science using computer drill and practice mode (CDPM), demonstration strategy (DS) and those taught with the convention lecture method.

Table 4.3 Summary of ANCOVA Analysis of the Mean Achievement Scores of Experimental Group 1,2 and the Control Group.

Treatment	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	8643.318a	3	2881.106	63.972	. 000
Intercept	73040.885	1	73040.885	1621.785	.000
Covariance (Pretest)	1390.704	1	695.352	6.727	.001

Treatments	8163.670	2	40811.835	90.632	.000
Error	9728.064	216	45.037		
Total	1319058.000	220			
Corrected Total	18371.382	219			

*: Significant at 0.05 level

Table 4.3 shows the ANCOVA analysis of mean scores of Experimental group I, Experimental group II, and Control group with F(2,217)= 90.632 and p-value was 00.0000.since p<00.05, hypothesis one is rejected. Therefore, there is significant difference between the mean achievement scores of junior secondary school student taught with computer drill and practice, demonstration strategy, and those taught with the conventional lecture method.

To find out where the significant difference lies, Scheffes post-hoc summary test was carried out. Table 4.4 shows the summary of scheffes post-hoc.

Table 4.4 Scheffes Post hoc Test on Mean Scores of Student Achievement Using Demonstration Strategy, Computer Drill/Practice and Conventional Method Method.

	Demonstration	Computer Drill and Practice	Lecture Method
Demonstration Strategy	-	-10.73*	4.37*
Computer Drill and Practice	-10.73*	-	15.10*
Lecture Method	-437*	-15.10*	-

*: Significant at P<001

Table 4.4shows that demonstration compared with computer drill and practice is significant. Also demonstration with lecture method is significant in favour of computer drill and practice.

Table 4.5 Mean Gain of Mean Achievement Scores of Male and Female Junior Secondary School Students Taught Basic Science Using Computer Drill and Practice Mode (CDPM)

Group	N	Pre-test		Post-test		Mean Gain
		Mean($\bar{X}$)	SD	Mean($\bar{X}$)	SD	Score
Male	28	42.68	10.88	82.25	9.12	39.57
Female	48	42.40	10.44	86.46	6.03	44.06

Table 4.5 shows the Mean and standard deviation of pre-test, post-test scores and mean gain scores of male and female student. Female students had the higher mean gain score of 44.06 followed by male students with mean gain scores 39.57.

Hypothesis Three (HO_2)

There is no significant difference in the mean achievement scores of male and female students taught Basic Science using computer drill and practice Mode (CDPM).

Table 4.6 t-test Comparison of Post-test Mean Achievement Score of Male and Female Junior Secondary School Students Taught Basic Science Using Computer Drill and Practice Mode (CDPM)

Group	Variance	N	Df	X	SD	t-value	P-value
	Male	28		82.25	9.12		
Post			74			0.15^{NS}	0.02
	Female	48		86.46	6.03		

*: Significant at 0.05 level

Table 4.6 shows the t-test analysis of posttest mean achievement scores of male and female junior secondary school students taught Basic Science using computer drill and practice mode (CDPM). t=0.15, df= 74,P-value = 0.02. since p<0.05, hypothesis two is rejected. Therefore, there is significant difference between the mean achievement scores of male and female junior secondary school students taught Basic Science using computer and practice mode (CDPM)

Table 4.7 Mean Gain Achievement Score of Male and Female Junior Secondary School Students Taught Basic Science Using Demonstration Strategy

Group	N	Pre—test Mean(X)	SD	Posttest Mean(X)	SD	Mean Gain Score
Male	38	37.34	11.39	73.42	6.91	36.08
Female	44	36.45	9.56	75.27	7.93	38.822

Table 4.7 shows the mean and standard deviation of pre-test, post-test scores, and mean gain score of male and female students as observed in the achievement scores of the students. Female students had the higher mean gain score of 38.82 as against male student with mean gain score of 36.08.

Hypothesis Three (HO_3)

There is no significant difference between the mean achievement scores of male and female students taught Basic Science using demonstration strategy (DS).

Table 4.8 t-test Comparison of Posttest Mean Achievement Score of Male and Female Junior Secondary School Students Taught Basic Science Using demonstration Strategy(DS)

Group	variance	N	Df	X	SD	t-value	P-value
	Male	38		73.42	6.91		
Post			80			0.80^{NS}	0.27
	Female	44		75.27	7.93		

NS: Not Significant at 0.05 level

Table 4.8 shows the t-test analysis of posttest scores of male and female junior secondary school students taught Basic Science using demonstration Strategy (DS),t=0.8 with df = 80, p-value = 0.27. since p<0.05 hypothesis four is retained. Therefore, there is no signature difference between the mean achievement score of male and female junior secondary school student taught Basic Science using demonstration Strategy (DS).

Discussion of Result

The findings of this study on the effect of computer drill, practice and demonstration strategies on student's achievement in Basic Science revealed that there was a significant difference between the mean achievement scores of junior secondary school student taught Basic Science using computer drill and practice, demonstration strategy, and conventional lecture method. This result is in agreement with the study by Olugbemi (2004) on the effect of a self-instructional computer-based package on Social Studies achievement of primary school pupil in Niger state whose result showed that those taught with self-instructional package performed better than those taught with the conventional lecture method. The study is also in corroboration with the study by Daluba (2013) who investigated the effect of demonstration method of teaching on students' achievement in Agricultural Science in senior secondary school Kogi state who found that the student in the experimental group taught with demonstration method performed better than those taught with conventional lecture method.

The finding of the study on the influence of gender on student's achievement when they were taught Basic Science using computer drill and practice mode showed that there was a significant difference in the mean achievement scores of male and female students. This finding is in agreement with Ajaja and Eraawoke (2010) who investigated the effects of gender on students' academic achievement. The result of their findings showed that there was a significant difference in the achievement of male and female students when computer-assisted was used.

The findings of the study on the influence of gender on achievement of students taught Basic Science using Demonstration Strategy reveals that there was no significant difference between the mean achievement scores of male and female students.

Conclusion

The result of this study confirmed that the use of computer drill and practice, demonstration strategy and conventional lecture method are effective for Basic Science teaching in Junior Secondary School Abuja Municipal Area Council (AMAC). The findings of the study also have convincing evidence that the use of computer drill, practice and demonstration strategy in Basic Science teaching can enhance junior secondary school students' achievement compared to using conventional lecture method.

Recommendations

1. Computer drill, practice, and demonstration strategy, should be adopted in teaching Basic Science as supplement to other traditional instructional strategies.
2. Teachers should be enlightened on the availability of different computer-based instructional (CBI) strategies that can yield better result in teaching and learning of Basic Science.
3. Teachers should be trained on more programming styles for effective utilization of computer drill and practice mode for better results.

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AWARENESS OF SCIENCE TEACHERS IN SCIENCE AND TECHNICAL SCHOOLS ABOUT NANOSCIENCE AND NANOTECHNOLOGY IN F.C.T ABUJA

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Abstract
The growing and rapid advancement in Nanoscience and Nanotechnology have led to the integration of Nanoscience and Nanotechnology courses in colleges or secondary schools, institutes and university curricula all over the world. However, in Nigeria it was only recently introduced in into secondary schools science curriculum. This study seeks to explore the awareness of science teachers in science and technical schools in Abuja about Nanoscience and Nanotechnology (NSNT). A survey research design was adopted for the study. Two research questions and two hypotheses were formulated to guide the study. The population consisted of 224 science teachers (136 Males and 88 Females) from five science and technical schools in Abuja. Simple percentage and frequency counts were used to analysis data questions while Analysis of variance (ANOVA) was used to test the hypothesis. The findings from this study revealed that, science teachers in science and technical schools are not aware of Nanoscience and Nanotechnology (NSNT). The study recommended that all stakeholders in the education sector should organize programs to train science teachers in secondary schools and science and technical colleges on NSNT and how to teach NSNT and its fundamental ideas in the classroom.

Keywords: Awareness, Science Teachers', Nanoscience, Nanotechnology.

Introduction

Nanoscience and Nanotechnology is one of the fastest and latest growing disciplines in the field of science born out of Science, Technology, Engineering and Mathematics (STEM). STEM encompasses and embrace a variety of subjects or discipline that falls into each of the term in the acronym STEM; some of this subjects include physics, chemistry, biology, astronomy, astrophysics, biochemistry, chemical engineering, Nanoscience and Nanotechnology, robotics, computer science, aerospace engineering and many more.

Nanoscience and Nanotechnology is a multi- disciplinary field that includes chemistry, physics, biology, material science and engineering (Ernst, 2009; Gardner, Jones, & Falvo, 2009). It is the science of small and ultra-small things (Cavanagh, 2009). Nanoscience and Nanotechnology (NSNT) can be taught in physics, chemistry, biology, engineering, material sciences, medicine and pharmaceutics. The inclusion of fundamental aspects of NSNT in the classroom or educational sector may address, for example, the physical world of size, force, properties and time. Furthermore, it could also address the dimensional aspects of nanostructure, one-dimensional space like thin film, two-dimensional space like nanotubes or three-dimensional space like quantum dots (Asmatulu & Misak, 2011, Luisa & Duncan, 2012). The concept of Nanoscience and Nanotechnology is attributed to Nobel Prize Winner Richard Feynman (1960) who stated that "there is plenty of room at the bottom proposed a new field of manipulating and controlling substance on a small scale called Nanoscale". His work, viewpoint and knowledge about the Nano and Nanoscale gave birth to the development of Nanoscience and Nanotechnology.

Awareness is the ability to directly know and perceive, to feel, or to be cognizant of events. More broadly, it is the state of being conscious of something (Smith, 2011). The level of awareness about a relatively new field like Nanoscience and Nanotechnology depends critically, among other factors, upon: the literacy rate of the population, Awareness created among different segments of the society by the scientific community through different channels of communication and the general attitude of the public towards technical innovations.

The need to raise public and professional awareness of Nanoscience and Nanotechnology (NSNT) has been assessed in a number of studies (Batt, Waldron & Broadwater 2008, Craig, 2009). However, none of these studies probed the level of awareness of science teachers about Nanoscience and Nanotechnology in science and Technical schools and how to teach NSNT and its fundamental ideas in the classroom. The awareness of science teachers about Nanoscience and Nanotechnology on its fundamental ideas becomes highly necessary. Furthermore, scholars have identified nine fundamental ideas which Nanoscience and Nanotechnology is based on. These nine big ideas include: Size and Scale, Structure of Matter, Forces and Interactions, Quantum Effects, Size-Dependent Properties, Self-Assembly, Tools and Instrumentation, Models and Simulations, Science, Technology and Society (Stevens, Sutherland & Krajcik, 2009).

The aforementioned fundamental ideas of NSNT are reflected or contained in the current curriculum of science and Technical schools in Nigeria. Based on these Ideas it is possible to teach Nanoscience and Nanotechnology in Science and Technical Schools in order to facilitate a teaching learning sequence for Science and Technical schools' students.

The rapid development and growing societal importance of Nanoscience and Nanotechnology (NSNT) have evoked educational concerns throughout the world. In the past two decades a growing body of science education research has been carried out concerning NSNT issues (Hingant & Albe 2010, Jones, Blonder, Gardner, Albe, Falvo & Chevrier, 2013). The United States of America for example recognized the important role of NSNT in Science and Society, the US National Science Foundation (NSF) funded a series of workshops in order to work out basic teaching ideas of the Nanoscience field.

Fazarro, Newberry, Trybula and Hyder (2012) opined that Science and the application of scientific knowledge at the Nanoscale will affect every market segment within the next decade. This scientific knowledge and technical skills needed by science students in Science and Technical schools can only be provided by science teachers who are aware and well informed about NSNT and have the capacity to decipher it.

As a consequence of this development, it has been frequently recommended that Nanoscience and Nanotechnology Education be provided at different levels of Education. These demands have been made from a variety of viewpoints of advocates, including governments and public administrations, industry and commerce, civic organizations, Nanoscientists and engineers, science and technology educators, and social scientists (European Commission, 2010; Healy, 2009). The most common concern is the impending lack of researchers, science teachers, engineers and other professionals with specialization in Nanoscience and Nanotechnology. In many cases, however, the need for NSNT Education has been expressed with reference to scientific and/or technological literacy (Zenner & Crone, 2008; Stevens *et al.*, 2009), on concepts that have remained highly influential in curriculum development projects worldwide (Holbrook, 2010). The basic idea in these claims is that all citizens will soon need some kind of Nanoscience and Nanotechnology Education or "Nano-literacy" in order to navigate some of the important science-based issues related to their everyday lives and society.

Hence, it is therefore important to carry out study on awareness of science teachers in science and technical schools about Nanoscience and Nanotechnology in F.C.T Abuja

Statement of the Problem

Many countries of the world have considered incorporating Nanoscience and Nanotechnology into their science curriculum because of its great potentials and prospects in the 21st century. Scientists confirm that Nanoscience and Nanotechnology (NSNT) will result in a new scientific revolution called the fourth industrial revolution. The need to raise student and academic staffs awareness about NSNT has been assessed in a number of studies Elmarzugi, Keleb, Mohammed, Benyones, Bendala, Mehemed and Eid,(2014), Ahmed, Imdad, Yaldram and Raza,(2015). However, none of these studies probed into the knowledge of the level of awareness of science teachers about Nanoscience and Nanotechnology in science and Technical schools and its fundamental ideas in the classroom. The awareness of science teachers about Nanoscience and Nanotechnology, its fundamental ideas and disciplinary content and knowledge becomes highly necessary. Nigeria a developing country should not be left behind in the field of Nanoscience and Nanotechnology (NSNT) Education at the secondary school level. Traditional science disciplines or subject such as physics, chemistry and biology have become too specialized, in the current science curriculum in science and technical schools in Nigeria and there is less space and time for teachers to teach NSNT and reflect the fundamental ideas of Nanoscience and Nanotechnology using the Nano concept and Nanoscale in the classroom. The fundamental ideas of Nanoscience and Nanotechnology (NSNT) have been identified by some Scholars, Scientists, Nanoscientists, Science Educators and Researchers to have a multidisciplinary, interdisciplinary and Transdisciplinary perspective. The challenge before science teachers is that should NSNT be taught in the classroom as a multidisciplinary, interdisciplinary or Trans disciplinary modus. Identifying what concepts to teach is the job of the syllabus or curriculum, but the nature and structure of each concept, and how connected concepts relate to the real world, are generally poorly defined and are left up to the teacher to decipher. Knowledge of disciplinary content, how to present and scaffold information, and understanding about NSNT needs of students and the individuals within each class characterizes the complex, interwoven practice of teaching. Hence it is also important in the context of exploring implications for teaching and learning to reflect and represents a significant shift in the way NSNT should be taught. The awareness of science teachers about Nanoscience and Nanotechnology and its disciplinary perspective becomes highly necessary.

Objectives of the Study

The study aimed to achieve the following objectives

(i) To determine the level of awareness of science teachers about Nanoscience and Nanotechnology (NSNT).

(ii) To determine if science teachers are aware of the fundamental ideas of Nanoscience and Nanotechnology (NSNT).

Research Questions

1. What is the level of awareness of Science teachers about Nanoscience and Nanotechnology?
2. What is the level of awareness of Science teachers about the fundamental ideas upon which Nanoscience and Nanotechnology is based on?

Research Hypotheses

The study tested the following null hypotheses at 0.05 levels of significances:

H_{O1}: There is no significant difference in awareness of Science teachers' about Nanoscience and Nanotechnology.

H_{O2}: There is no significant difference in awareness of Science teachers' about the fundamental ideas upon which Nanoscience and Nanotechnology is based upon.

Methodology

A survey research design was used to find out the level of awareness of science teachers about Nanoscience and Nanotechnology (NSNT) in science and technical school in Abuja. The population consisted of 224 science teachers (136 Males and 88 Females) from all the five (5) Science and Technical Schools in the six (6) municipal councils of the Federal capital territory (FCT) Abuja. Purposive sampling techniques was used for selecting the schools for the study since the schools are few, widely spread across the various municipal councils in the Federal Capital Territory (FCT) Abuja. The entire population of 224 Science teachers was used as the sample size for the study (Ibrahim, 2013) since they can be conveniently covered, there was no need sampling the respondents for the study. The instrument for data collection was the questionnaire on awareness of Science teachers about Nanoscience and Nanotechnology in Science and Technical schools (AOSTANSNTQ) with reliability coefficient of 0.96 was used for the study. Simple percentage and frequency counts were used to answer the research question while Analysis of variance (ANOVA) was used to test the hypothesis.

Results

Table 1: % Response of Science Teachers Level of Awareness about Nanoscience and Nanotechnology

S/N	STATEMENT	Negative response (N.A)	% Negative response	Moderate response (M.A)	% Moderate response	Positive response (A+H.A)	% Positive response
		F	%	F	%	F	%
1.	I have heard about the term Nanoscience and Nanotechnology	140	75.3	3	1.6	43	23.1
2.	I have not heard about Nanoscience and nanotechnology	179	96.2	1	0.5	6	3.2
3.	Science teachers are aware of Nanoscience and Nanotechnology	145	78.0	6	3.2	35	18.8
4.	Science teachers are not aware of Nanoscience and Nanotechnology	171	91.9	8	4.3	7	3.8
5.	Nanoscience and Nanotechnology cut across traditional sciences such as Physics, Chemistry, Biology, material science and so on.	138	74.2	6	3.2	42	22.6
6.	Nanoscience and Nanotechnology do not cut	179	96.2	4	2.2	3	1.6

	across traditional sciences such as Physics, Chemistry, Biology, material science and so on.						
7.	The Nano is equivalent to one billionth $\frac{1}{1000,000,000}$ or 10^{-9}	135	72.6	0	0	51	27.4
8.	The Nano is not equivalent to one billionth $\frac{1}{1000,000,000}$ or 10^{-9}	186	100	0	0	0	0
9.	The nanometer is equivalent to one billionth of a meter $\frac{1}{1000,000,000}$ m or 10^{-9}m?	135	72.6	0	0	51	27.4
10.	The nanometer is not equivalent to one billionth of a meter $\frac{1}{1000,000,000}$ m or 10^{-9}m?	185	99.5	0	0	1	0.5
	Average % of positive, moderate and negative response	**85.65**		**1.50**		**12.84**	

Table 1 shows the percentage analysis of science teachers' awareness about Nanoscience and Nanotechnology positive, moderate and negative responses. The average percentage of positive, negative and moderate responses on awareness about Nanoscience and Nanotechnology are 12.84%, 85.65% and 1.50%. This indicates that science teachers in science and technical schools are not aware of Nanoscience and Nanotechnology.

Table 2: % Response of Science Teachers Level of Awareness about the fundamental Ideas Upon which Nanoscience and Nanotechnology is Based On

S/N	STATEMENT	Negative response (N.A)	% Negative response	Moderate response (M.A)	% Moderate response	Positive response (A+H.A)	% Positive response
		F	%	F	%	F	%
1.	Science teachers are aware of the fundamental ideas of Nanoscience and Nanotechnology	136	73.1	6	3.2	44	22.7
2.	Science teachers are not aware of the fundamental ideas of Nanoscience and Nanotechnology	177	95.2	8	4.3	1	0.5
3.	The fundamental ideas of Nanoscience and Nanotechnology cuts across	136	73.1	5	2.7	45	24.2

	traditional science such as Physic, Chemistry, Biology and many more.						
4.	The fundamental ideas of Nanoscience and Nanotechnology do not cuts across traditional science such as Physic, Chemistry, Biology and many more.	180	96.8	5	2.7	1	0.5
5.	The fundamental ideas of Nanoscience and Nanotechnology are interdisciplinary	135	72.6	5	2.7	46	24.8
6.	The fundamental ideas of Nanoscience and Nanotechnology are not interdisciplinary	178	95.7	8	4.3	0	0
7.	The fundamental ideas of Nanoscience and Nanotechnology do not cut across traditional science	173	93.6	10	5.4	3	1.6
8.	The fundamental ideas of Nanoscience and Nanotechnology present a challenge to curriculum planners, designers and developers	151	81.2		3.2	29	15.6
9.	The fundamental ideas of Nanoscience and Nanotechnology do not present a challenge to curriculum planners, designers and developers	170	91.4	5	2.7	11	5.9
10.	The interdisciplinary nature of the fundamental ideas of Nanoscience and Nanotechnology calls for curriculum inclusion of Nanoscience and Nanotechnology	140	75.3	4	2.2	42	22.6
11.	The interdisciplinary nature of the fundamental ideas of Nanoscience and Nanotechnology does not calls for curriculum inclusion of Nanoscience and Nanotechnology	178	95.7	4	2.2	4	2.2
12.	The ideas of Nanoscience and Nanotechnology are the fundamental basis for	139	74.7	8	4.3	40	21

	Nanoscience and Nanotechnology						
13.	The ideas of Nanoscience and Nanotechnology are not the fundamental basis for Nanoscience and Nanotechnology	179	96.2	3	1.6	4	2.2
	Average % of positive, negative and moderate responses		**85.70**			**3.20**	**11.1**

Table 2 shows the percentage analysis of science teachers' awareness about the fundamental ideas of Nanoscience and Nanotechnology positive, moderate and negative responses. The average percentage of positive, negative and moderate responses on awareness about the fundamental ideas of Nanoscience and Nanotechnology are 11.1%, 85.70% and 3.20%. This indicates that science teachers in science and technical schools are not aware of the fundamental ideas upon which Nanoscience and Nanotechnology is based on.

Table 3: ANOVA comparison of the level of awareness of Science teachers about Nanoscience and Nanotechnology

Source variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	731.298	5	146.260	3.653	.004
Within Groups	7206.164	180	40.034		
Total	7937.462	185			

Table 3 presents ANOVA results of the level of awareness of Science teachers about Nanoscience and Nanotechnology. The result yielded an F- value of 3.653 and a P-value of 0.004 ($P<0.05$). The result shows that there was statistically significant difference in awareness of Science teachers about Nanoscience and Nanotechnology because $P<0.05$. Therefore hypothesis one (HO_1) was rejected.

Table 4: ANOVA comparison of the level of awareness of Science teachers about the fundamental ideas upon which Nanoscience and Nanotechnology is based on

Source of variation	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	869.931	5	173.986	2.956	.014
Within Groups	10595.730	180	58.865		
Total	11465.661	185			

Table 4 presents ANOVA results of the level of awareness of Science teachers' about the fundamental ideas upon which Nanoscience and Nanotechnology is based on. The result yielded an F- value of 2.956 and a P-value of 0.014 ($P<0.05$). The result shows that there was statistically significant difference in awareness of Science teachers' about the fundamental ideas upon which Nanoscience and Nanotechnology is based on because $P<0.05$. Therefore hypothesis two (HO_2) was rejected.

Discussion of Findings

The findings of the study on the awareness of science teachers about Nanoscience and Nanotechnology in Abuja revealed a low level of awareness of science teachers' about Nanoscience and Nanotechnology (NSNT). This study is not in concurrence with the findings of Ahmed, Imdad, Yaldram and Raza,(2015) who examined the level of awareness and the attitude towards Nanotechnology (NT) among the students and teachers of some higher Educational institutions of Islamabad, Pakistan which revealed a high level of awareness about Nanoscience and Nanotechnology both among teachers and students. The findings of the study on the awareness of science teachers about the fundamental ideas upon which Nanoscience and Nanotechnology (NSNT) is based on also revealed a low level of awareness about the fundamental ideas of Nanoscience and Nanotechnology among science teacher. This is a true reflection of the low level of awareness of science teachers' about Nanoscience and Nanotechnology (NSNT). This study is not in concurrence with the findings of Laherto (2011) on Incorporating Nanoscale science and technology into Finnish secondary school curriculum in which all the respondents in the study are aware of the fundamental ideas upon which Nanoscience and Nanotechnology (NSNT) is based on as pointed out essentially as the "Big Ideas" of NSNT by Stevens *et al*. (2009).

Conclusion

In conclusion it is possible to introduce and teach Nanoscience and Nanotechnology (NSNT) at the secondary school level to increase students' understanding of nano-related science concepts and to promote Nanoscience literacy.

Science teachers need professional development to help those finding ways to teach and connect Nanoscience and Nanotechnology in the existing science curricula and syllabus. This can be done by specific guidance of making connections between new and old topics, and by showing exactly where and how in the curriculum the new concepts can be embedded.

In addition, science teachers need professional development to provide instructional materials, workbooks and technology and to help in finding ways how to use the new materials to teach Nanoscience and Nanotechnology concepts in the classroom.

Recommendations

Based on the findings of the results of the study, the following recommendations were made.

1. Nanoscience and Nanotechnology (NSNT) should be taught in the classroom either in any of the three (3) perspectives; interdisciplinary, multidisciplinary and Transdisciplinary perspective.
2. Nanoscience and Nanotechnology (NSNT) can also be taught in the classroom as a subject on its own in secondary schools and science and technical colleges.
3. The current science curriculum and syllabus should expand the scope of NSNT in secondary schools and science and technical colleges beyond the 9th fundamental idea.
4. Policies and strategies should be developed to encourage and motivate science teachers' in secondary schools and science and technical colleges to teach NSNT in the classroom.

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INFLUENCE OF UTILISATION OF ELECTRONIC INFORMATION RESOURCES ON ACADEMIC PERFORMANCE OF POSTGRADUATE STUDENTS IN FEDERAL UNIVERSITIES IN NORTH CENTRAL NIGERIA

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Abstract
The study investigated the utilisation of electronic information resources on academic performance of postgraduate students in federal universities in North Central Nigeria. The study was guided by seven (2) objectives which are; find out the various electronic information resources utilised by postgraduate students in federal universities in North Central Nigeria, determine the influence of electronic information resources on academic performance of postgraduate students in federal universities in North Central Nigeria and one (1) null hypothesis. The study adopted descriptive survey research design. The population for the study was two hundred and fifty-two (252) postgraduate students in three (3) Federal Universities in North Central, Nigeria. Total enumeration or census was used for the study. The research instrument used was self-designed questionnaire with 4-point rating scale. Descriptive statistics of frequency counts, percentages, mean and standard deviation were used to analyse the demographic data of the respondents and data generated from the two (2) research questions raised, while, pearson product moment coefficient (PPMC) was used to test the null-hypothesis raised. The null-hypothesis is tested at 0.05 level of significance as criterion for accepting or rejecting the null-hypothesis. The major findings of the study revealed that, the majority of the postgraduate students studied were highly satisfied with the use of electronic information resources (books, journals, newspapers, dictionaries, thesaurus, encyclopedia abstracts and bibliographies). Results of the null-hypothesis tested revealed that utilisation of electronic information resources has high significant on the academic performance of postgraduate students in federal universities in North Central, Nigeria. The study recommended the need for library and school management of the institutions studied to improve on the existing Information and Communication Technology infrastructure so that there can be an increase in the utilisation of information resources, the school management should make more funds available for subscription to electronic databases, the library management should provide alternative power supply for the effective utilisation of electronic resources by the users and the library management of the institutions studied should organise more information literacy skills for users of the library so that they can search databases with precisions.

Keywords: Academic Performance; Electronic Information Resources; North Central Nigeria; Postgraduate Students; Utilization.

Introduction

The library is a hub of academic activities whether public, private, special, school or academic. It is a place of life-long learning and individual development. Succinctly, the library is a collection of various information resources in different format, systematically selected, acquired, processed, preserved, organized and kept/shelved for effective accessibility and utilization by patrons. In order to achieve this, the library has been compartmentalized into various departments, units and sections, such as the readers' department, reference department, serial management department, technical services department etc. The library situated in institutions of higher learning is referred to as academic library. One of the primary function of an academic library is to acquire adequate information resources in electronic format for the utilisation of its clientele. The electronic resources acquired by the academic library is meant to complement and supplement the aims and objectives of the parent institution through the provision of adequate and relevant electronic information resources which are in line with the curriculum of the parent institution for which the library is situated.

The library provides services to support the teaching/learning, research and community services of the parent institution. Teaching and learning in the 21st century is no longer narrowed to using printed information resources. Electronic versions of many print resources have now been made available on the Internet. Some of the advantages of using electronic or digital information resources include their relative accessibility and flexibility in terms of time and space. Electronic resources also allow the inclusion of multimedia contents such as motion pictures, graphics, video and audio clips, which cannot be presented in print resources. These and other factors have contributed to growing acquisition rates of e-books, e-journals and other electronic documents in academic libraries around the world (Bodomo, Lam & Lee, 2003).

Furthermore, in crowded cities like Hong Kong, the limited space occupied by digital resources in digital libraries is an even more attractive reason why users of library facilities in academic and public libraries are being encouraged to read electronic versions of information resources. Adeniran (2013) maintained that, electronic resource is one of the emerging trend in libraries and information communication in the competitive service, these electronic resources usually consist of e-books, e-Journals, articles, newspaper, thesis, dissertation, databases and CD-ROMs, which are likely to be the alternative to the print media. The familiarity and utilization of electronic information resources in academic libraries for teaching, research and rapid development is necessary and important.

Postgraduate students need various kinds of information resources for reading, conducting assignments and their self-development. For quality services delivery in academic libraries, postgraduate students must have adequate access to retrieve and utilise various electronic information resources in whatever means they are represented (Ntui & Udah, 2015). The electronic information resources available in a library play a prominent role in facilitating access to the required information to postgraduate students in an expediency manner. (Adeniran, 2013).

Information resources implies those channels and media through which information is obtained or retrieved from, that is, the corpus of information materials available in print or electronic format. These encompasses all forms of information carriers in the library, and it could also be seen as means where information is extracted from, as Chima and Nwokocha (2013) opined that information resources include all forms of information carriers that can be used to provide and encouraged effective teaching and research activities. Furthermore, Hadley School Committee (2014), reported that information resources are those materials, both in print and electronic, found in the library, information centres or Internet, which support curricular and personal information needs. Moreover, printed information resources include books, magazines, newspapers, pamphlets, microfiche or microfilm – in paper-based format. Electronic information resources however, include films, slides, video and audio recording, electronic databases etc. It should be added that, library information resources encompass both print and electronic materials, covering books, journals and magazine articles, newspapers, encyclopedias and other references sources, electronic databases and electronic documents etc. For effective library services to be attained, adequate provision of both print and electronic information resources must be put in place to facilitate utilization by its clienteles.

Information resource utilisation is the practical and deliberate effort to maximize the use of library resources identified and acquired by a student for the purpose of solving problems or achieving a set goal such as attaining a high Grade Point Average (G.P.A) in his academic programme (Ntui & Udah, 2015). Postgraduate students are expected to use library information resources for reading, research, and consultation in carrying out their academic assignments. This could be achieved if library information resources are readily available and accessible. Thus, library resources are of no value to students until they have been utilised. The academic performance of postgraduate students in universities depends to some extent on the accessibility and utilization of library resources available in their academic libraries.

Succinctly, academic performance of students can be defined as the extent to which students have attained their academic objectives, in terms of gaining more knowledge about specific subjects, improvement in their learning habits and scoring high Cumulative Grade Point Average (CGPA) in their courses. Academic performance is the extent to which students, faculties or institutions have realized, accomplished or attained their short or long-term educational goals. To corroborate this assertion, Yusuf (n.d.) reported that the terms academic performance, academic achievement and learning outcome are used interchangeably. The author further posit that academic performance of a student denotes the observable and measurable progress of that student in his academics. Therefore, academic performance encompasses all the observed behavior or expectation of a student in achieving specific educational goals, it consists of scores obtained from continuous assessments and examinations. Hijazi & Naqvi (2006) asserted that the measurement of academic performance of students is quite challenging task since student performance is usually affected by socio-economic, psychological and environmental factors, in which social media platforms have a great influence in this contemporary time.

In addition, academic performance of a student in any semester is measured with the Grade Point Average (G.P.A). The GPA is an up-to-date weighted mean of the grade points, where the weights are the course credit units (Nnamdi Azikiwe University Academic Programme, 2010 in Nzewi, Chiekezie and Ikon, n. d). However, the overall measure of the students' academic performance is obtained through the Cumulative Grade Point Average (CGPA) at any given point in his programme. Contrary, Young (2005) in Nzewi, Chiekezie and Ikon (n. d) critiqued the CGPA as inadequate measure of academic performance and suggested in his studies that Item Response Theory (IRT) based GPA is a more reliable measure of performance which is used to measure the validity of traditional preadmission's information. Notwithstanding, it is imperative for every student to score a high CGPA to enable him/her advance in his scholarly pursuit. This is dominant in master's degree in most universities. A CGPA bench-mark is set as a criteria to enroll for PhD after the master's degree. This shows the importance of attaining a high CGPA at postgraduate level, as students are required to meet satisfactory academic progress or a minimum academic performance requirement as established by the university (Australian National University, 2018).

According to El-Tantawi (2009), researchers have tried to examine the effect of different factors on students' academic performance. According to the researcher, some of these factors are related to the students' past performance in previous exams, attendance, score on a quiz in the same course, factors related to personality traits, learning preferences and information resource utilization by the student. Moreover, academic performance during examinations may be assumed to reflect the effectiveness of teaching, the effectiveness of the students' learning styles, and how much effort students put in studying and utilising the available course materials pertaining to that course. The effect of these factors may be initially assessed by a quiz administered early in the course. If the students obtain a high score on this quiz, it can be hypothesized that they eventually will obtain a high score on the final exam.

Electronic information resources are important research materials that complement the printed resources in libraries. Their advantages include access to information that might be restricted to remote users, access to more current information, and provision of extensive links to additional resources or related content (Owolabi, Okocha and Ogundare, 2016). Quadri, Adetimirin, and Idowu (2014) submitted that the postgraduate students in Nigerian universities need information to satisfy their social, psychological and academic needs to support and improve their academic performance during their course of study in the university. Accordingly, the university library is established to provide adequate and relevant information resources in electronic formats. The electronic information resources like CD-ROM, audio-visual materials, databases, e-books and e-journals are to support their coursework, project work, term papers and seminar presentation, provides relevant information and services for effective and efficient achievement of academic excellence by students.

Statement of the Problem

Ideally, it is expected that postgraduate students of any institutions have access to, and utilise the rich collection of electronic information resources in the library for the purpose of research and carrying out academic assignments. Aside the provision of adequate information resources, academic libraries should provide expert professional support to facilitate the effective utilization of these electronic resources. However, research has shown that even when these electronic information resources are readily available and accessible, these resources appear to be underutilised by postgraduate students (Ntui & Udah, 2015). Similarly, because some postgraduate students find it difficult to manipulate electronic resources especially Online Public Access Catalogue (OPAC), online databases and Internet resources, they may eventually develop a phobia for electronic resources. Furthermore, it is observed by the researchers that most libraries do not provide technical supports and trainings to their clienteles on how to use these electronic resources. It is against this backdrop that the researchers deem it fit to undertake this research studies, in order to find out how the academic performance of postgraduate students in federal universities in north central Nigeria is being affected by utilisation of electronic resources.

Objectives of the Study

The general objective of this study is to find the influence of utilisation of electronic information resources on academic performance of postgraduate students in federal universities in north central Nigeria.

The specific objectives are to:

1. find out the various electronic information resources utilised by postgraduate students in federal universities in North Central Nigeria.

2. determine the level of satisfaction derived by postgraduate students in the utilisation of electronic information resources in federal universities in North Central Nigeria.
3. determine the influence of electronic information resources on academic performance of postgraduate students in federal universities in North Central Nigeria.
4. find out the problems encountered by postgraduate students while utilising electronic information resources in federal universities in North Central Nigeria.

Research Questions

The following research questions guided the study:

1. What are the electronic information resources utilised by postgraduate students in Federal Universities in North Central Nigeria?
2. What is the level of satisfaction derived by postgraduate students in the utilisation of electronic information resources in federal universities in North Central Nigeria?
3. To determine the influence of electronic information resources on academic performance of postgraduate students in federal universities in North Central Nigeria?
4. What are the problems encountered by postgraduate students while utilising electronic information resources in federal universities in North Central Nigeria?

Research Hypothesis

The following null hypothesis was tested at 0.05 level of significance:

$\mathbf{H_{o1}}$: There is no significant relationship between utilization of electronic information resources and academic performance of postgraduate students in federal universities in north central Nigeria.

Significance of the Study

This study will be of great significance to postgraduate students and the library management. The findings from this study will enlighten postgraduate students of the significance of adequate utilisation of electronic information resources, to their academic performance. Moreover, the electronic information resources are available in the library free of charge – the postgraduate students will understand how greatly utilisation of electronic resources can boost and enhance their academic performance. Specifically, it will probably increase their proficiency in the use of electronic media to search, access and retrieve information resources for their research and academic assignments. Similarly, this study will provide empirical evidences to library management, of the need to acquire and maintain a balance collection of electronic information resources for the utilisation of postgraduate students in their institution. Furthermore, it will assist librarians in advancing convincing reasons to the management of their institution for improved funding for acquiring electronic information resources. It will also ensure judicious and proportionate financial allocation based on the needs and preferences of postgraduate students as to the format of the type information resources to acquire. Additionally, this study will contribute immensely to the body of knowledge, as it will provide empirical evidences to researchers and scholars on the influences of utilisation of electronic information resources on academic performance of postgraduate students.

Methodology

Research Design

The research design used for this study is descriptive survey. Descriptive survey research design is most suitable for this study because it described the influence of utilisation of electronic information resources on academic performance of postgraduate students. Sharma

(2017) stated that descriptive survey research method deals with describing the situation of a given population using some characteristics or features common among them. Furthermore, Salaria (2012) maintained that, descriptive survey research design is concerned with the collection of data on and describing in systematic manner, the characteristics, features or facts about a given population.

Population of the Study

The population for this study is comprised of Two Hundred and Fifty Two (252) postgraduate students from Federal Universities in North Central Nigeria, as shown in Table 1.

Total Population Table

S/No	Institutions	Total Number of Postgraduate Students in LIS Department
1	University of Abuja, Nigeria	-
2	Federal University of Technology Minna, Niger State	50
3	Federal University Lokoja, Kogi State	-
4	Federal University Lafia, Nasarawa State	-
5	Federal University of Agriculture Makurdi, Benue State	107
6	University of Ilorin, Kwara State	95
7	University of Jos, Plateau State	-
	Total	**252**

Source: Preliminary investigation by the researcher (2018)

The reason behind the choice of postgraduate students in the Department of Library and Information Science is the fact that they are more familia with various electronic information resources available in the library. Moreover, only three (3) of the seven (7) federal universities in North Central Nigeria offer Library and Information Science at postgraduat level.

Sample Size and Sampling Techniques

The sample size for the study is 252 postgraduate students. Total enumeration or census method was employed for the study since the total population is small and manageable that the researchers can handle.

Research Instrument

The research instrument used for this study was a structured or closed-ended questionnaire titled "Questionnaire for Utilisation of Electronic Information Resources on Academic Performance of Postgraduate Students in Federal Universities in North Central Nigeria" (QUEIRAPPSFUNCN) was administered to the postgraduate students in the Department of Library and Information Science in Federal Universities in North Central Nigeria.

Validity and Reliability of the Research Instrument

The research instrument was subjected to face, content and construct validity by two (2) lecturers in the field of Library and Information Science/Technology, and one (1) expert from measurement and evaluation. The reliability of the instruments was tested using Cronbach Alpha method to determine the internal consistency of the instrument and was found to be highly reliable. The instrument shows an overall correlation of 0.97, which is a near perfect correlation. Furthermore, the following correlations from groups of items testing different categories of constructs were as follows: cluster A = 0.94; cluster B = 0.90; cluster C = 0.85; and cluster D = 0.72. With regards to this result, the instrument was adopted for the study. This was done by conducting a pilot study using the postgraduate students in the Department of Library and Information Science, Ahmedu Bello University (ABU) Zaria, Kaduna State, Nigeria.

Data Analysis, Results and Discussion

Response Rate

A total of two hundred and fifty two (252) copies of the questionnaire were administered to postgraduate students in Library and Information Science Department in Federal University of Technology Minna, Niger State, Federal University of Agriculture Makurdi, Benue State and University of Ilorin, Kwara State. From the administered two hundred and fifty two (252) copies of questionnaire that were administered, two hundred and nine (209) copies were filled and returned representing 83% response rate.

The breakdown of the response rate is shown in Table 2

Table 2 Response Rate

S/No	Institution	No of Administered Questionnaire	No of Returned Questionnaire	Percentages (%) Of Questionnaire Returned
1	Federal University of Technology Minna, Niger State	50	38	15
2	Federal University of Agriculture Makurdi, Benue State	107	93	37
3	University of Ilorin, Kwara State	95	78	31
	Total	**252**	**209**	**83**

Table 2 revealed that 38(15%) copies of the questionnaire were retrieved for Federal University of Technology Minna, Niger State, 93 (37%) copies were from Federal University of Agriculture Makurdi, Benue State and 78 (31%) copies of questionnaire were retrieved University of Ilorin, Kwara State. An aggregate response rate of 209 (83%) was obtained.

Results & Data Analysis

Research Question 1: What are the electronic information resources utilized by postgraduate students in Federal Universities in North Central Nigeria?

Table 3: Electronic Resources Utilised by Postgraduate Students

S/N	ITEMS	Mostly Used	Used	Rarely Used	Not Used	MEAN	STD
1	E-Books	163 (78.0)	37 (17.7)	1 (0.5)	8 (3.8)	3.70	0.67
2	E-Journals	147 (70.3)	41 (19.6)	21 (10.0)	0	3.60	0.66

3	Online Magazines	60 (26.7)	47 (22.5)	50 (23.9)	52 (24.9)	2.55	1.15
4	E-Newspapers	83 (39.7)	76 (36.4)	34 (16.3)	16 (7.7)	3.08	0.93
5	E-Dictionaries	61 (29.2)	101 (48.3)	30 (14.4)	17 (8.1)	2.99	0.87
6	E-Thesaurus	37. (17.7)	77 (36.8)	63 (30.1)	32 (15.3)	2.57	0.95
7	Online Maps	36 (17.2)	84 (40.2)	55 (26.3)	34 (16.3)	2.58	0.96
8	E-Year book	20 (9.6)	56 (26.8)	73 (34.9)	60 (28.7)	2.17	0.96
9	E-Manual	30 (14.4)	66 (31.6)	69 (33.0)	44 (21.1)	2.39	0.98
10	E-Guidebook	21 (10.0)	68 (32.5)	75 (35.9)	45 (21.5)	2.31	0.92
11	E-Pamphlets	22 (10.5)	84 (40.2)	59 (28.2)	44 (21.1)	2.40	0.94
12	E-Encyclopedia	74 (35.4)	66 (31.6)	29 (13.9)	40 (19.1)	2.83	1.11
13	E-Abstracts	80 (38.3)	73 (34.9)	24 (11.5)	32 (15.3)	2.96	1.06
14	E-Bibliographies	80 (38.3)	87 (41.6)	23 (11.0)	19 (9.1)	3.09	0.92
15	Electronic database	101 (48.3)	59 (28.2)	48 (23.0)	1 (0.5)	3.24	0.82
16	CD ROM	52 (24.9)	86 (41.1)	38 (18.2)	33 (15.8)	2.75	1.00
17	Online Public Address Catalogue (OPAC)	95 (45.5)	95 (45.5)	9 (4.3)	10 (4.8)	3.32	0.77
	Sectional Mean					**2.85**	

Table 3 revealed that thirteen (13) of the items listed have a mean score greater than the benchmark mean of 2.50 on a four-point rating scale. These are item 1:E-books ($\bar{X}$=3.70, SD=0.67),item 2 E-journals ($\bar{X}$=3.60, SD=0.66), item 3: Online Magazines ($\bar{X}$=2.55, SD=1.15), item 4 E-Newspaper : ($\bar{X}$=3.08, SD=0.93), item 5: E-Dictionaries ($\bar{X}$=2.99, SD=0.87),item 6: E-Thesaurus ($\bar{X}$=2.57, SD=0.95), item 7: Online maps ($\bar{X}$=2.58, SD=0.96), item 12: Encyclopedia ($\bar{X}$=2.83, SD=1.11), item 13: Abstracts ($\bar{X}$=2.96, SD=1.06), item 14: Bibliographies ($\bar{X}$=3.09, SD=0.92), item 15: Electronic database ($\bar{X}$=3.24, SD=0.82), item 16: CD-ROM ($\bar{X}$=2.75, SD=1.00), item 17: Online Public Address Catalogue (OPAC) ($\bar{X}$=3.32, SD=0.77).The remaining items have a mean score lower than the benchmark mean of 2.50 on a four-point rating scale. These included item 8: E yearbook ($\bar{X}$=2.17, SD=0.96), item 9: E-manuals ($\bar{X}$=2.39, SD=0.98), item 10:E-guidebook ($\bar{X}$==2.31, SD=0.92), item 11: E-pamphlets ($\bar{X}$=2.40, SD=0.94)

Research Question 2: What is the level of satisfaction derived by postgraduate students in the utilisation of electronic information resources in federal universities in North Central Nigeri

Table 4: Level of Satisfaction Derived in the Use of Electronic Resources

S/N	ITEMS	VHE	HE	LE	VLE	MEAN	STD
1	E-Books	135 (64.6)	63 (30.1	3 (1.4)	8 (3.8)	3.56	0.71
2	E-Journals	112 (53.6)	87 (41.6)	2 (1.0)	8 (3.8)	3.45	0.71
3	Online Magazines	19 (9.1)	92 (44.0)	98 (46.9)	0	2.62	0.65
4	E-Newspapers	42 (20.1)	95 (45.5)	71 (34.0)	1 (0.5)	2.85	0.74
5	E-Dictionaries	74 (35.4)	66 (31.6)	53 (25.4)	16 (7.7)	2.95	0.96
6	E-Thesaurus	52 (24.9)	62 (29.7)	69 (33.0)	25 (12.0)	2.68	0.98
7	Online Maps	45 (21.5)	69 (33.0)	77 (36.8)	18 (8.6)	2.67	0.91
8	E-Year book	32 (15.3)	70 (33.5)	87 (41.6)	20 (9.6)	2.55	0.87
9	E-Manual	44 (21.1)	59 (28.2)	70 (33.5)	36 (17.2)	2.53	1.01
10	E-Guidebook	57 (27.3)	45 (21.5)	71 (34.0)	36 (17.2)	2.59	1.07
11	E-Pamphlets	50 (23.9)	49 (23.4)	82 (39.2)	28 (13.4)	2.58	0.99
12	E-Encyclopedia	60 (28.7)	65 (31.1)	74 (35.4)	10 (4.8)	2.84	0.90
13	E-Abstracts	93 (44.5)	80 (38.3)	34 (16.3)	2 (1.0)	3.26	0.76
14	E-Bibliographies	71 (34.0)	73 (34.9)	63 (30.1)	2 (1.0)	2.99	0.83
15	Electronic database	120 (57.4)	60 (28.7)	13 (6.2)	16 (7.7)	3.36	0.90
16	CD ROM	74 (35.4)	77 (36.8)	41 (19.6)	17 (8.1)	3.00	0.94
17	Online Public Address Catalogue (OPAC)	96 (45.9)	76 (36.4)	12 (5.7)	25 (12.0)	3.16	0.99
	Sectional Mean					**2.92**	

Table 4 revealed that all seventeen (17) of items listed have a mean score greater than the benchmark mean of 2.50 on a four-point rating scale. These are item 1: E-Books ($\bar{X}$=3.56, SD=0.71), item 2: E-Journals ($\bar{X}$=3.45, SD=0.71), item 3: Online Magazines ($\bar{X}$=2.62, SD=0.65), item 4: E-Newspaper ($\bar{X}$=2.85, SD=0.74), item 5: E-Dictionaries ($\bar{X}$=2.95, SD=1.96),item 6: E-Thesaurus ($\bar{X}$=2.68, SD= 0.98), item 7: Online Maps ($\bar{X}$=2.67, SD=0.91), item 8: E-yearbook ($\bar{X}$=2.55, SD=0.87), item 9: E-guidebook ($\bar{X}$=2.53 SD=1.01), item10: E-guidebook ($\bar{X}$=2.59, SD=1.07) item11: E-pamphlets ($\bar{X}$=2.58, SD=0.99), item 12: E-

Encyclopedia ($\bar{X}$=2.84, SD= 0.90), item 13: Abstracts ($\bar{X}$=3.26, SD=0.76), item 14: E-Bibliographies ($\bar{X}$=2.99, SD=0.83), item 15: Electronic Database ($\bar{X}$=3.36, SD=0.90) ,item 16: CD ROM ($\bar{X}$=3.00, SD=0.94), item 17: Online Public Address Catalogue (OPAC) ($\bar{X}$=3.16, SD=0.99).

Research Question 3: To determine the influence of electronic information resources on academic performance of postgraduate students in federal universities in North Central Nigeria?

Table 5: Influence of Electronic Information Resources on Academic Performance

S/N	ITEMS	VHI	HI	LI	VLI	MEAN	STD
1	E-Books	157 (75.1)	27 (12.9)	16 (7.7)	9 (4.3)	3.59	0.81
2	E-Journals	187 (89.5)	12 (5.7)	10 (4.8)	0	3.85	0.48
3	Online Magazines	65 (31.1)	53 (25.4)	62 (29.7)	29 (13.9)	2.74	1.05
4	E-Newspapers	72 (34.4)	41 (19.6)	68 (32.5)	28 (13.4)	2.75	1.07
5	E-Dictionaries	86 (41.1)	65 (31.1)	21 (10.0)	37 (17.7)	2.96	1.15
6	E-Thesaurus	79 (37.8)	34 (16.3)	51 (24.4)	45 (21.5)	2.70	1.18
7	Online Maps	27 (12.9)	72 (34.4)	69 (33.0)	41 (19.6)	2.41	0.95
8	E-Year book	44 (21.1)	41 (19.6)	82 (39.2)	42 (20.1)	2.42	1.04
9	E-Manual	6 (2.9)	61 (29.2)	92 (44.0)	50 (23.9)	2.11	0.79
10	E-Guidebook	28 (13.4	38 (18.2)	94 (45.0)	49 (23.4)	2.22	0.95
11	E-Pamphlets	25 (12.0)	39 (18.7)	111 (53.1)	34 (16.3)	2.26	0.87
12	E-Encyclopedia	61 (29.2)	92 (44.0)	38 (18.2)	18 (8.6)	2.94	0.91
13	E-Abstracts	108 (51.7)	63 (30.1)	30 (14.4)	8 (3.8)	3.30	0.85
14	E-Bibliographies	119 (56.9)	47 (22.5)	35 (16.7)	8 (3.8)	3.33	0.89
15	Electronic database	140 (67.0)	29 (13.0)	23 (11.0)	17 (8.1)	3.40	0.98
16	CD ROM	69 (33.0)	75 (35.9)	48 (23.0)	17 (8.1)	2.94	0.94
17	Online Public Address Catalogue (OPAC)	94 (45.0)	77 (36.8)	29 (13.9)	9 (4.3)	3.22	0.85
	Sectional Mean					**2.89**	

Table 5 revealed that twelve (12) of the items listed have a mean score greater than the benchmark mean of 2.50. These are item 1: E-Books ($\bar{X}$=3.59, SD=0.81), item 2 E-Journals ($\bar{X}$=3.85, SD=0.48), item 3: Online Magazines ($\bar{X}$=2.74, SD=1.05), item 4: E-Newspaper : ($\bar{X}$=2.75, SD=0.07), item 5: E-Dictionaries ($\bar{X}$=2.96, SD=1.11),item 6: E-Thesaurus ($\bar{X}$=2.70, SD= 1.18), item 12: E-Encyclopedia ($\bar{X}$=2.94, SD= 0.91), item 13: E-Abstracts ($\bar{X}$=3.30, SD=0.85), item 14: E-Bibliographies ($\bar{X}$=3.33, SD=0.89), item 15: Electronic Database ($\bar{X}$=3.40, SD=0.79), item 16: CD ROM ($\bar{X}$=2.94, SD=0.94), item 17: Online Public Address Catalogue (OPAC) ($\bar{X}$=3.22, SD=0.85). The remaining items have a mean score lower than the benchmark mean. These included item7: Online maps ($\bar{X}$=2.41, SD=0.95), item 8: E-yearbook ($\bar{X}$=2.41, SD=1.04), item 9: E-manual ($\bar{X}$=2.11 SD=0.79), item 10:E-guidebook ($\bar{X}$=2.22, SD=0.95), item 11: E-pamphlets ($\bar{X}$=2.26, SD=0.87).

Research question 4: What are the problems encountered by postgraduate students while utilising electronic information resources in federal universities in North Central Nigeria?

Table 6: Problems Encountered by Postgraduate Studied While Using Electronics Information Resources

S/N	ITEMS	SA	A	D	SD	MEAN	STD
1	Lack of browsing skills	24(11.5)	31(14.8)	84(40.2)	70(33.5)	2.04	0.46
2	Insufficient ICT infrastructures	87(41.6)	58(27.8)	43(20.6)	21(10)	3.00	0.51
3	Poor knowledge of search strategy	16(7.7)	11(5.3)	73(34.9)	109(52.1)	1.68	0.82
4	Complexity of online resources	32(15.3)	18(8.6)	67(32.1)	92(44)	1.95	0.55
5	High subscription cost	79(37.8)	95(45.5)	20(9.6)	15(7.2)	3.14	0.64
6	High downloading/printing cost	21(10)	18(8.6)	78(37.3)	92(44)	1.85	0.65
7	Unstable power supply	103(49.3)	46(22)	34(16.3)	26(12.4)	3.08	0.58
8	Low internet bandwidth	117(56)	75(35.9)	10(4.8)	7(3.3)	3.45	0.95
9	Lack of time for browsing	9(4.3)	12(5.7)	71(34)	117(56)	1.58	0.92
10	Too many online databases	85(40.7)	98(46.9)	16(7.7)	10(4.8)	3.23	0.74

Sectional Mean	**2.5**

Table 4.9 revealed that out of the ten (10) items listed, 5 have a mean score greater than the benchmark mean of 2.50 indicating they are problems encountered by postgraduate students while utilising electronic information resources in federal universities in North Central Nigeria. These are item 2: Insufficient ICT infrastructures ($\bar{X}$=3.00, SD= .51), item 5: High subscription cost ($\bar{X}$=3.14, SD=0.64), item 7: Unstable power supply ($\bar{X}$=3.08, SD= 0.58), item 8: Low internet bandwidth ($\bar{X}$=3.45, SD= 0.95) and item 10: Too many online databases ($\bar{X}$=3.23, SD= 0.74).

The remaining items have a mean score lower than the benchmark mean. This means that they are not problems encountered by postgraduate students in the use of electronic information resources. These are item 1: Lack of browsing skills ($\bar{X}$=2.04, SD= 0.46), item 4: Complexity of online resources ($\bar{X}$=1.95, SD= 0.55), item 3: Poor knowledge of search strategy ($\bar{X}$=1.68, SD= 0.82), item 6: High downloading/printing cost ($\bar{X}$=1.85, SD= 0.65) and item 9: Lack of time for browsing ($\bar{X}$=1.58, SD = 0.92).

Hypothesis Testing

H_{o2}: There is no significant relationship between utilization of electronic information resources and academic performance of postgraduate students in federal universities in North Central Nigeria.

Pearson Product Moment Coefficient (PPMC) was used to test the null-hypothesis raised. The results of the hypothesis test statistics is presented in Table 7.

Table 7: Relationship between Utilisation of Electronic Resources and Academic Performance of Postgraduates Students Studied.

Variable	n	df	Mean	SD	R	P
Utilisation of Electronic Resources	209		48.55	10.68		
		207			0.728^{**}	0.05
Academic Performance of Postgraduate Students	209		46.85	9.80		

Table 7 showed that the correlation coefficient = 0.728 P> 0.05 that is critical value R 0.728 is greater than P = 0.05. Therefore, the null hypothesis which states that there is no significant relationship between utilization of electronic information resources and academic performance of postgraduate students in federal universities in North Central Nigeria is rejected. This revealed that utilization of electronic information resources increases the academic performance of postgraduate students studied positively. This implies that low utilization of electronic information resources will lead to low academic performance.

Summary of Major Findings

The major findings of the study are as follows:

1. E-books, E-journals, Online Magazines, E-Newspaper, E-Dictionaries, E-Thesaurus Online maps, E- Encyclopedia, E- Abstracts, E- Bibliographies, Electronic database, CD-ROM and Online Public Address Catalogue (OPAC) are the electronic resources highly utilized by the postgraduate students studied

2. The study revealed that postgraduate students are satisfied with the use of E-Books, E-Journals, Online Magazines, E-Newspapers, E-Dictionaries, E-Thesaurus, Online Maps, E-Year book, E-Manual, E-Guidebook, E-Pamphlets, E-Encyclopedia, E-Abstracts, E-Bibliographies, Electronic database, CD ROM and Online Public Address Catalogue (OPAC).

3. E-Books, e-journals, online magazines, e-newspaper, e-dictionaries, e-thesaurus, e-encyclopedia, e-abstracts, bibliographies, electronic database, CD ROM and Online Public Access Catalogue (OPAC) are the electronic information resources that influence academic performance of postgraduate students in the institutions studied.

4. Revealed that insufficient ICT infrastructures, high subscription cost, unstable power supply, low Internet bandwidth and too many online databases are the problems encountered by postgraduate students while utilising electronic information resources in federal universities in North Central Nigeria.

5. There is significant relationship between utilization of electronic information resources and academic performance of postgraduate students in federal universities in North Central Nigeria.

Conclusion

It could be concluded that E-books, E-journals, Online Magazines, E-Newspaper, E-Dictionaries, E-Thesaurus Online maps, E- Encyclopedia, E- Abstracts, E- Bibliographies, Electronic database, CD-ROM and Online Public Address Catalogue (OPAC) are the electronic information resources that are highly utilized by the respondents studied. The study revealed also that postgraduate students studied are satisfied with the used of electronic information resources such as E-Books, E-Journals, Online Magazines, E-Newspapers, E-Dictionaries, E-Thesaurus, Online Maps, E-Year book, E-Manual, E-Guidebook, E-Pamphlets, E-Encyclopedia, E-Abstracts, E-Bibliographies, Electronic database, CD ROM and Online Public Address Catalogue (OPAC). Similarly, the electronic information resources utilized have positive influence on the academic performances of the students studied. Despite the high utilization of electronic information resources, there are still some challenges encountered in the use of these resources. They are insufficient ICT infrastructures, high subscription cost, unstable power supply, low Internet bandwidth and too many online databases are the problems.

Recommendations

Based on the findings of the study, the following recommendations are hereby made:

1. The library and school management of the institutions studied should improve on the existing Information and Communication Technology infrastructure so that there can be an increase in the utilization of information resources.
2. The school management should make more funds available for subscription to electronic databases.
3. The library management should provide alternative power supply for the effective utilization of electronic resources by the users.
4. The library management of the institutions studied should organize more information literacy skills for users of the library so that they can search databases with precisions.

Contribution to Knowledge

This study contributes to knowledge in the following areas:

1. The study unravelled that although so many studies have been conducted on utilisation of electronic information resources but none has been conducted on the influence of utilisation of electronic information resources on academic performance of postgraduate students. This will contribute to knowledge in that regard.
2. The study established the relationship between utilization of electronic resources and academic performance of postgraduate students in federal universities in North Central Nigeria.
3. The study will also contribute to the existing literature in the subject field and indeed the corpus of knowledge.

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OCCUPATIONAL STANDARDS IN INDUSTRIES: THE NEED FOR TVET CURRICULUM REVIEW

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Abstract
Despite the contemporary importance attached to Technical and Vocational Education Training (TVET) as a solution for tackling growing unemployment in developing nations, Nigerian TVET graduates are not well equipped with the employability skills to match the occupational standards needed by industries and the labour market at large. This has been as a result of globalization of trade and commerce, rapid technological changes, emergence of new technologies and information and communication technology (ICT) revolution. Therefore, causing industries, educational institutions and government stakeholders to redefine their partnerships and working together to create competency-based, industry-driven education at the local, state, and national levels. Though several approaches have been adopted as solution to this problem, there seems to be no head way. This calls for new strategies hence the need to review TVET curriculum by integrating Competency Based Education and Training (CBET) in Technical and Vocational Education Training (TVET). This paper focused on the occupational standards in industries and the need to review TVET curriculum. The paper discussed the concept, objectives and role of TVET. It also reviewed Competency Based Education and Training, occupational standards and highlighted the benefits of occupational standards as well as the need to review TVET curriculum. Based on the related literature reviewed and findings from subject matter experts, it is clear that there is an urgent need for TVET educational stakeholders and institutions to adapt CBET in their curricula in order to produces graduates that have the necessary skills and competencies needed by industries. It was recommended that educational organisations, in particular TVET providers, stakeholders, such as policy makers and practitioners should take urgent steps to revisit and update TVET curricula at all levels, to ensure that such competences are properly included in students' learning outcomes

Keywords: Occupational Standards. Competency Based Education and Training, TVET and Curriculum Review

Introduction

The global economy is now leading to a new reality in which human potential itself has become the major agent of economic growth, however, many young people are lagging behind. In nearly all countries and regions, there is an increasing number of young people, who are having difficulties in entering the workforce and establishing sustainable careers for themselves (MG, 2012). According to the ILOs Global Employment Trends for Youth 2013 report, the global youth unemployment escalates from 12.3 to 12.4 percent between 2011 to 2012, and has continued to increase to 12.7% in 2014. These high rates of youth unemployment signify both widespread personal misfortune for individuals and a loss of opportunity for national and global economic development. As Charest (2011) highlighted that we entering the era of unparalleled talent scarcity, which, if left unaddressed, will put a brake on economic growth around the world, and will fundamentally change the way we approach workforce challenges.

The lack of skills relevant to the workplace is among the major reasons why young people are highly unemployed in Nigeria. Moreover, the growing number of youth unemployment in the country has contributed largely to the worsening problem of poverty among the populace (Nwobasi, 2011). This is because they lack the necessary occupational skills needed to be self-employed or function effectively in today's world of work. The acquisition of occupational skills is seen universally as a key driver of economic and technological development and the essential role of Technical Vocational Education and Training (TVET) is facilitating these skills necessary for both socioeconomic and technological development of countries globally, thereby accounting for the increasing importance being attached to TVET. Hence, it could be said that Technical, Vocational Education and Training TVET is the program needed in order to handle the current youth unemployment problems in Nigeria, as it play a significant role in developing human and social capital, promoting necessary skills, knowledge and expertise needed for more sustainable societies and economies.

Technical and Vocational Education and Training (TVET) is getting education, knowledge and skills for the employment opportunities. The contribution of TVET is generating of gainful employment, encouraging self-employment and entrepreneurship development, better earning which ultimately helps them to uplift their living standard. With this aspect many technical and vocational schools, training centres are established over the country. The main aim is to make all the citizens skilful for the overall development of the nation. Not only this, it aims to develop a high level skilful human resource that is needed for the country. Unfortunately, even though TVET has great importance to alleviate poverty, reduce unemployment and underemployment, and help graduates to cope with the ever changing technology and economy, its quality of delivery is low especially in developing countries. In general, the quality of training is low, with due emphasis on theory and certification rather than on acquisition of skills and proficiency testing. Inadequate training of instructors, obsolete training equipment and lack of instructional materials are some of the factors that reduce the effectiveness TVET program in meeting the required occupational standards.

Occupational standards are the set of competencies required to do a certain job, they specify what an individual need to know, understand and do to carry out a particular job role or function. These occupational standards can be defined in terms of organizational standards, national standards and/or international standards. The occupational standards not only vary from one occupation to another but also from one job level to another in the competence hierarchy of an organization. The occupational standards help management increase productivity by facilitating the recruitment of new employees and identifying what needs to be done to upgrade the competencies of the existing workforce. These written standards also help employees understand what they are expected to do and provide them with a reference to a self-assessment of their abilities and training needs. Occupational standards also provide the employees with guidelines for certification/accreditation to sustain and develop their occupational competencies. Standards help employees take control over their carrier path by providing them with a better understanding of the required competencies and the level of these competencies they will need as they move up the hierarchy of positions within the organization. With the rapidly changing business environments in which organizations function, they have been mandated to develop the optimum harnessing of the human resource that enables the organization to attain a competitive advantage through the process of capacity building. Successful high-performance organizations realize that their continued success depends mainly on the capabilities of their employees. This drives these organizations to focus on recruiting an appropriate workforce in line with their organizational needs and standards. Occupational standards and related training standards and assessments are an essential link between workplace employment requirements and human capital development (i.e., education and training programs) that affect individual citizens throughout their life span. Therefore, TVET curriculum will need to be reviewed and strengthened to produce high quality TVET graduates that meet the occupational standards needed by industries. These roles can be realized when competency based TVET program is applied.

Competency based TVET curriculum is becoming popular in the world. It aims at making TVET much more relevant to meeting the needs of industry and user agencies. Regarding the relevance of competency based curriculum, Dakmara (2012), emphasized that, there is a growing interest of community of educators and curriculum developers in enhancing competencies and competence-based curriculum because competency-based approaches are increasingly regarded as adequate solutions for reshaping the education system in its ability to empower educators and curriculum developers to adapt their roles to new circumstances and respond to constantly rising new situations in a rapidly changing world. In the same way, Montero (2014) stressed that, training based on competency based curriculum enables trainees to acquire knowledge, skills and attitude of defined standards corresponding to relevant work place requirement and to reflect the realities of work place. Competency based training focuses on what is expected of the learners in applying what they have acquired, embodies the ability to transfer and apply knowledge and skills to new situations and environments and lays emphasis on practical experiences. For the realization of this, the relevance and effectiveness of competency based training program offered in schools is very crucial. The effectiveness and efficiency of any educational program is largely dependent on the philosophy of curriculum design followed. In addition, the effectiveness of TVET program depends on the philosophy of curriculum design it follows to prepare competent graduates that cope up with the ever-changing economic conditions of the world. The curriculum is the force that derives the TVET program to its destination (Sudsomboon and Anmanatrkul, 2007).

Competency based training appeared in education and training system as a response to the traditional education and training that has prevailed in the country. Traditional education and training is characterized by disciplinary knowledge, and it is subject-based. Its curriculum consists mainly of courses dealing with conceptual knowledge with limited practical works which doesn't match with the contemporary occupational standards required by industries. In addition, in traditional education and training, there is little attention to application of theory, and as a result, the graduates' skills do not coincide with the demands of trade and standards of industries (Sullivan, 2012). TVET providers are rapidly increasing day by day to fulfil the need of the people. In the context of Nigeria, the market based curriculum and courses are not developed properly to address the current need of the industry. The main gap is that the occupational standards of industries and education of the TVET graduates doesn't match. TVET system is not sufficiently market based. The limited access and equity of the needed people as per the industry requirement is not addressed by the TVET. UNESCO-UNEVOC (2013) has stated that the potential human resource has difficulties in getting employment in the labour market due to lack of sufficient skills. The higher level graduates also face the difficulties on getting better jobs as per their skills because of lack of skills that is needed in the industry. The quality of the TVET graduates doesn't address the need or occupational standards of industries, which seems the most challenging task for both the educational sector and the labour market. To ensure an effective TVET system the education and training must have to rely on labour market information, demands and employers need; particularly in priority occupational standards. This could be realized through strengthening TVET curriculum. TVET curriculum can be strengthened to produce high quality TVET graduates that meet the occupational standard of industries. The need to review TVET curriculum hereby becomes a necessity in order for graduates to meet the occupational standards of industries.

Concept, Objectives and Roles of TVET

TVET refers as those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, knowledge and understanding related to occupations in various sectors of the economic and social life. According to Okoye and Okwelle (2013) TVET is the form of education that emphasizes pragmatic attitude as a priority and advocates the development of the head (knowledge), training of hand (dexterity) and enrichment of the heart (consciousness and painstaking). Okoye and Okwelle (2013) further defined TVET as a diversified form of education that focuses on suitable manpower production relevant to the needs of the industry, society and the changing technological work environment.

Citing UNESCO, Maigida (2014) defined TVET as the form of education and training designed to inculcate practical skills, knowledge and understanding necessary for employment in particular occupations or trades. In the context of this study, TVET is an integration of the vocational and technical education programmes covering agricultural education, business education, home economics education and technical education offered in Universities and Colleges of Education in Nigeria for the preparation of individuals that will take up teaching in the field at the secondary and tertiary levels of the education system, be employed in the industry or become entrepreneurs. The programmes are generally located in the faculty or school of education and can be housed in the department of vocational education, vocational technical education or technology and vocational education in the two levels of tertiary institutions. Generally, the programmes focus on impartation of knowledge, development of relevant practical skills and attitudes needed by individuals to actively participate and contribute to the welfare of their communities at all times.

According to Maigaji and Bankole (2014), the 2001 UNESCO recommendations on TVET for sustainable development had the following three objectives:

i. To contribute to the achievement of the societal goals of greater democratization and social, cultural and economic development while at the same time developing the potential of all individuals both men and women for active participation in the establishment and implementation of the goals regardless of religion, race and age;
ii. To lead to an understanding of the scientific and technological aspects of the contemporary civilization in such a way that people comprehend their environment and are capable of acting upon it while taking a critical view of
iii. The social, political and environmental implications of scientific and technological change and
iv. To empower people to contribute to environmentally sound sustainable development through their occupations and other areas of life.

In line with the above, the Federal Government of Nigeria (FRN, 2004) outlined the objectives of TVET in the country as:

i. To acquire technical and vocational skills
ii. To expose recipients to career awareness by exploring useable options in the world of work
iii. To enable youths, develop intelligent understanding of the complexity of technology
iv. To stimulate creativity

On the roles of TVET, Oweh (2013) observed that TVET has prospects of poverty eradication, job creation, sustainable development and actualization of the transformation agenda of the Nigerian Federal Government. In support, Magaji and Bankole (2014) stated that TVET could play a pivotal role in the provision of skilled workforce needed for Nigeria's economic transformation. Adekunle et al. (2014) affirmed that TVET could nurture the necessary practical skills for agricultural, industrial, commercial and economic development and thus build a self-reliant nation. Furthermore, Uwaifo (2014) highlighted the roles TVET could play in the economic growth and development of Nigeria to include (1) conservation and development of natural resources, (2) prevention of waste of human labour, (3) increment in the wage of people and (4) reduction of unemployment Uwaifo (2014) further posited that if effectively implemented, TVET programmes could contribute to improvements in the nation's agricultural development and food production while Maclean (2011) and Okolocha (2012) affirmed that TVET is a suitable instrument for curbing social exclusion (where cost of higher education is out of the reach of the majority) and an antidote for youth unemployment (where the labour market is saturated). TVET could stimulate economic growth and social development and improve conventional education, empowerment of youths and women, wealth creation, poverty reduction and skills enhancement.

The highlight of the foregoing is that TVET is a form of education that has immense benefits to individuals and nations and as such should be given the attention it deserves. For instance, in a nation like Nigeria with recurrent youth restiveness, TVET will help youths and adults become self-reliant, enhance the skills of industry workers and mitigate high employment turn-over and the risk of obsolesce. It will help government alleviate poverty, eradicate corruption, attain food security and significantly reduce violent crimes and communal clashes involving unemployed youths most of the time. For this to happen, there is need for TVET institution to embrace competency based education and training so has to ensure that graduates skills match the occupational standards and labour market.

Competency Based Education and Training (CBET)

Kaaya (2012) defined CBET as a program of study with clearly defined, concrete and measurable objectives of which every student participating in the program must have demonstrated mastery upon program completion. Often these programs also involve students working at their own rate and structuring their own methods of learning so as to meet these objectives. According to Deißinger and Hellwig (2011) CBET is the specification of knowledge and skill and the application of that knowledge and skill to the standard of performance expected in the workplace.

Similarly, Anane (2013) described CBET as an industry and demand driven (outcomes-based) education and training programme based on well-defined industry generated standards (occupational standards). Anane further stated that these industry standards are the basis upon which the program (curriculum), assessment and learning materials are designed and developed. CBET programmes focus on what the participant is expected to be able to do in the workplace as opposed to just having theoretical knowledge. It is therefore a training programme which ensures that learners gain the necessary knowledge, skills and attitudes or values to be successful in the working environment.

Based on the foregoing, CBET can been viewed as a way of approaching (vocational) training that puts much emphasis on what a person can do as a result of the training (the outcome), and as such represents a shift away from an emphasis on the process involved in the training (the inputs). Furthermore, CBET itself may be described as training which is performance- and standards-based and related to realistic workplace practices. It is learner –focused and works naturally with independent study and with the instructor in the role of facilitator. Learners often find different individual skills more difficult than others. This CBET learning method allows a student to learn those individual skills they find challenging at their own pace, practicing and refining as much as they like. Then, they can move rapidly through other skills to which they are more adept. Consequently, this type of learning requires mastery of every individual learning outcome making it very well suited to learning credentials in which skills acquisition is very essential (Foyster, cited in Sullivan, 2005).

Writing on the importance of CBET, Kufaine and Chitera (2013) posited that CBET is a human resource development approach which has given expectation to stakeholders that the gap between labour market and education will be reduced. This means CBET approach help the students acquire skills that are necessary for the industry; hence the approach demand participation of industry during training so that the competence experiences enable the students to demonstrate skills that are relevant for the industry (Kufaine & Chitera, 2013). As Harris et al (cited in Kaaya, 2012) noted, competency-based education is perceived by some as the answer to the improvement of education and training for the complex current world. CBET is concerned with training to industry specific standards rather than an individual's achievement relative to others in the group (Kaaya, 2012). Remarkably, Kaaya (2012) provided further insight into the importance of CBET by summarizing CBET that bases on competency standards, focused on outcomes not inputs, involving industry, taking account of recognition of prior learning (RPL), modularized, self-paced, assessment based on demonstration of skills rather than knowledge, assessment criterion referenced and ungraded, flexible delivery, makes the technical institutions autonomous and competencies are widely recognized.

Competency Based Education and Training (CBET) can be traced back to the education of primary and vocational teachers in the USA in the 1970s. Poor learning in vocational education programs was the reason for applying new principles to teacher education (Deißinger & Hellwig, 2011). It must be stated here that today, there are different CBET models with countries such as Netherlands, Canada, UK, South Africa, Japan, all using CBET mode of training. The differences are mainly in terminologies, processes for the development of programmes and in assessment methods. However, the characteristics, structure and objectives of CBET are the same for all models (Anane, 2013). In line with the above, it is obvious that competence based education and training and occupational standards of any industry works hand in hand.

Occupational Standards

Competence based approach and National Occupational Standards began in the UK and started gaining acceptance in many developed and developing countries. Background of the efforts in all these countries is the increasing importance of a versatile and competent workforce as success factor in the context of increasing globalization, international competition and rapid technological changes. In order to address the mismatch between the results of education and training and qualification requirements of the demand side, competency based systems have been selected as the approach to align the system of education and training with requirements of the demand side. Occupations and related occupational standards are key success factors in filling the gap between the demand side and education and training system. Occupational standards reflect the actual workplace situation related to current and future requirements. Demand oriented TVET uses occupational standard as the target or expected outcome for TVET delivery. Accordingly, occupational standards are key factors in linking and matching the world of work with the world of education and training (MOE, 2007).

Occupational standards define the competencies of a worker according to the requirements in the labour market. Furthermore, occupational standards comprehensively describe the competence a person has to achieve in order to be considered qualified in a certain field. Competence includes the entire range of skills, knowledge and attitude necessary to perform a specific job (MOE, 2008).

Occupational standards are used to describe a job role or occupation. It specifies the standards of performance that the trainees are expected to achieve in their work, and knowledge and skills they need to perform effectively. An occupational standard is seen as a benchmark against which the actual performance of individuals can be compared and assessed as competent or not (Mahmood, 2010). It is like the study statement in a position or job description. These statements describe what a person in particular job is required to achieve and specify the standard to which the job should be done (Brown, 2014). The specific job for which a student is going to be prepared must be designed clearly in a competency based instruction system. This is the only way that the instructor can relate to the student the nature and purpose of the skills and knowledge which will be mastered. For each job competency, there must be a standard that the instructor compiles a detailed and well researched list of skills or competencies which are representative of those required by local employers of an individual who works in that particular job classification (Perry and William, 2011).

Competency standards are related to the job. Thus, the best way to prepare competency standards is to consult with the employers regarding what they expect of their employees. According to Dyson and Jack (2005), competency standards are developed with considerable industry input and describe the skills, knowledge and attitudes required for effective performance in the work place. In the same, way Brown (1994) also emphasized that competency standards can be devised by the industrial parties or their nominees who are known as competency standard bodies. Competency based standards are matters that are very much related to industry. The industrial parties form a working party which researches and analyses the occupation under consideration. From this work, competency statements are written. However, it is not enough just to identify what needs to get done, so that the statements are converted into competency standards. This happens when the standard to which the job needs to be done is written in statements. Competency standards are bench marked across occupations and industries using national standards framework. The framework provides a bridge between the competency requirements of work and work structure and TVET training system.

Benefits of Occupational Standards

Standards have a great contribution to human lives. Without standards it is impossible to compare, judge and use many of the products and services over the world. Occupational standards describe the skills, knowledge and attitude needed to perform competently in the work place (Mahmood, 2010). According to Mahmood (2010) the introductions of competency standards have great benefits to industry, employers and employees. These benefits are listed below.

- **Benefits to Industry:** Industries will have opportunity to recruit, develop and maintains a skilled workforce, and they ensure that occupational requirements are equitable. Occupational standards increase competitiveness and productivity of industries. Furthermore, they facilitate mobility of labour within a country and abroad. They help to identify and communicate human resource and training needs of industries.
- **Benefits to Employees:** Based on Occupational Standards, employees identify skills and knowledge needed for an occupation. Occupational standards provide references to assess ability and training needs, and they identify and support clear career paths. Furthermore, Occupational standards provide guidelines for certification or accreditation and increase mobility within industries. They act as benchmark for rewarding experience, knowledge and competence.
- **Benefits to Employers:** Occupational standards increase productivity and reduce costs for recruitment by facilitating the selection of new employees. They provide a means for a better human resource planning and help effective skill upgrading.

Need for TVET Curriculum Review

Change is an important component of curriculum dynamics and such changes need to be studied and managed for a better future. With the advent of more innovative ideas and with the advancement of technology, curriculum seems to be changing even more to meet today's needs and realities. Contemporary curriculum changes manifest in a set of inter-related trends or features. Some of these have been identified by Priestly (2011) and Yates (2012) as:

- Global developments have significantly influenced national and regional curriculum activities on both fronts:
- There is a growing recognition that education and the curriculum should prepare students for workplace, citizenship and daily living. Hence teaching and learning processes are being focused on how to prepare students for learning, living and thriving in the dynamic, cluttered, chaotic information environment of these first decades of the 21st century as well as how to prepare students for a changing world.
- Most countries have undertaken major reforms of their curriculum within the past 15 years with increased emphasis on skills and dispositions, which are perceived as relevant to lifelong learning, employment and social participation.
- Most national curricula incorporate higher order thinking skills, multiple intelligences, technology and multimedia, the multiple literacy of the 21st century and authentic assessments.
- Life-long learning, creativity, Science, Technical and Vocational Education, Mathematics and global citizenship skills are part of the curriculum in all countries. Even in countries where the curriculum is structured in terms of individual subject areas, an interdisciplinary approach to learning is increasingly encouraged.
- Educational content and teaching-learning materials now appear to be more functional, diversified, and operational in nature. An increased emphasis is placed on relevance, flexibility, needs, and competence in curriculum delivery.
- Demographics, population, health, nutrition, and environment are becoming dominant factors in what appears to be a value-oriented instructional design process focused on the global community. Moreover, the very nature of educational structure that drives curriculum and educational methodologies is undergoing a significant change.
- Currently a movement is toward Information and Communications Technology, these advancements in technology are leading to a multitude of approaches that are blending a milieu of curriculum that caters to the needs of learners worldwide.
- There is emphasis on the need for teachers to use differentiated curriculum, multiple learning styles and engage in transformational teaching.
- Information professionals have also created directories, in nearly all subjects in the curriculum, of what are viewed as the most useful and appropriate in their respective disciplines. Many online instructional delivery formats have been made available for teachers to access and use in curriculum delivery (for example, schemes of work, lesson plans and ideas, exemplification of learners' work).
- Further, many countries have introduced National Qualifications Frameworks; the shift to learning outcomes; and the move from subject specific to generic curriculum criteria.

The emergent curriculum trends call for new skills, knowledge and ways of learning to prepare students with abilities and competencies to address the challenges of an uncertain, changing world. In curriculum's knowledge-building role, there is a great desire for new global 21st century skills that are necessary foundations in education, and should be concretely should be taught over several years of schooling. This is in line Obanya (2013) who noted that the world is now a knowledge society and more jobs require people to be skilled and knowledgeable workers. Such skills include:

- Critical thinking and problem solving
- Collaboration across networks and leading by influence
- Agility and adaptability
- Initiative and entrepreneurialism
- Effective oral and written communication
- accessing and analysing information
- curiosity and imagination

According to Finch and Crunkilton, (1999) a systematically developed TVET curriculum is data based, dynamic, explicit in its outcomes, fully articulated, realistic, student oriented, evaluation conscious, future oriented and world class focused In addition, Ahimed (2010) indicated that TVET curriculum needs be to founded upon appropriate school and community related data. It must be constantly examined in terms of what it is doing and how well it meets students' need. TVET curriculum should be reviewed regularly to make it responsive to changes in the world of work. Curricular outcomes must be defined as explicitly as possible. They help to measure whether students achieve the outcomes related to a particular occupation or field. A TVET curriculum should be consistent with the needs of the labour market and relevant to current and future job opportunities if students are to be prepared properly for employment. It has to be student oriented, that is, it has to meet students' need. It should allow various teaching learning methods or approaches. TVET curriculum is future oriented. It must be responsive to today's needs, as well as tomorrow's needs and the performance of TVET graduates should result in products and services that should be world class.

Conclusion

This present study examined occupational standards in industries: the need for TVET curriculum review. In line with this, the study examined the concept, objectives and role of TVET, competency based educational and training, occupational standards and lastly the need to review TVET curriculum. Based on the reviewed literature, it's no news that there is a fallen standard on the competency and skills required by graduates especially graduates of TVET and this has indirectly and directly affected their ability to get jobs, stay in this jobs and excel in this jobs. Industries have written down occupational standards required by their employee and if graduates' skills do not match this standard it becomes a problem. This problem has been traced back to the education and training gotten in our educational institutions and the only way this can be corrected is if the content, delivery and assessment of subject matters are revisited and updated; therefore, the need to review the curriculum becomes essential.

Recommendations

Based on the literature reviewed, the following recommendations were made.

I. National Board for Technical Education (NBTE) and TVET institutions jointly engage participants with profound knowledge of occupational standards, different educators, curriculum experts and industry experts in the preparation of competency based TVET curriculum materials as well as give practice based training on competency based TVET curriculum material preparation for trainers.

II. TVET institutions officials strictly follow and supervise the actual implementation of competency based strategies during training and give feedback to the trainers.

III. Government and concerned bodies should use media for awareness creation, the role competency based TVET curriculum play in poverty and unemployment reduction.

IV. Government and TVET officials should play their part in putting TVET policy framework and strategy into practice in order to improve TVET-industry linkage.

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CURRICULUM ISSUES AND INNOVATIONS IN TECHNOLOGY EDUCATION IN THE 21ST CENTURY FOR SUSTAINABLE DEVELOPMENT IN NIGERIA

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Abstract:
This paper discusses curriculum issues and innovations in technology education, hence, it is said that the success of any nation is determined by the type of curriculum they have in place, the purpose of this paper highlights aspect of curriculum process and issues, innovations in technology education in Nigeria. The focus of this paper shifts to roles for new innovations in technology education and curriculum. Issues that hamper the curriculum to change in direction that are important for teaching and learning are identified. The following recommendation are hereby preferred among other, Government should employ adequate number of qualified subject teachers in order to teach all the subjects meant for secondary school education. Enough funds should be allotted for education so that the payment of teacher salaries, allowances and other entitlements could be made with ease. This will as well make purchase of instructional materials and provision of facilities possible.

Keywords: Technology Innovation, 21st Century, Curriculum Issues.

Introduction:
A school curriculum usually refers to the content, objectives and organization of learning (walker 2003). In studying a curriculum, the classical question is about what should be learned by the students and taught by the teachers and why: It is a quest for the right balance of knowledge domains that are considered important for the development of the society as well as the student (tyler 1949). Within the societies the curriculum therefore expresses simultaneously a legacy from the past and aspiration and anxieties about the future" (Williamson 2013). As such it is an important instrument for change and societal development. Because of this, curriculum is not only a concern of governments but also of schools and teachers. However increasingly due to globalization, curriculum questions are also a concern of supranational organizations such as the organization of economic co-operation and development (OECD) and the European union (EU) and because of the attention of individualization in the postmodern society curriculum as a means to contribute to personal development are called for as well (van den Akker 2003).

Due to the rise of the knowledge society and in particular, the development of information and communication technologies, there is a call for redefining the role and function of the curriculum as well as a means to facilitate the enactment of the curriculum in practice (cf. voogt et al 2013). Surprisingly however, not much has been written about what a curriculum should be in the digital age (Williamson 2013).

ISSUES OF IMPLEMENTING SCHOOL CURRICULUM AT DIFFERENT LEVEL.

Curriculum implementation is the stage when in the midst of learning activities, teacher and learners are involved in negotiations aimed at promoting learning. It is the transmission of the planned curriculum into the operational curriculum (Offorma, 2005). The major implementers of the curriculum are the teachers, they setup learning opportunities aimed at enabling learners acquire the desired knowledge, skills, attitudes and values. Without implementation, there will be no evaluation and the students learning will not be guided. A good curriculum plan can be marred at the implementation stage. Curriculum implementation is fraught with a lot of issues which include:

CURRICULUM OVERLOAD:

There exist curriculum overload at both primary and secondary school level, this overload occurs because of the high number of subjects to be offered at both the junior and senior secondary school levels (Ivowi, 2005: Anwuka, 2005).The issue is not only the large amount of knowledge, skills, attitude and values to be presented to the learners, but the availability of adequate time and resources for the implementation of these content areas. The non-coverage of the content has left the learner to be half-baked as some teachers rush to cover the contents thereby treating the contents shabbily while others leave a lot of grounds uncovered.

The effect of this is poor performance of the students as a result of smattery knowledge of the content. In a bid to cover the content, most teachers neglect the practical aspect of the curriculum. This causes inability to transfer learning and solve individual and group problem. In this case education becomes dysfunctional.

LARGE CLASS POPULATION:

Another Issue in Curriculum implementation is large class population. In the National Policy on Education (FGN, 2004). The recommended class size is 30. The universal primary education launched in 1976 brought about increase in school enrolment without adequate teacher production to match the school population (World Bank 1995; Bajah 1995 onwu, 1998; Nwagwu, 2003). This Increase led to overcrowded classrooms which are experienced today in all level of education. Even in many Pre-primary Schools, a class is made up of 25 children when they should be at most 15 for effective teachers-pupils interaction. In this case it is either that the proprietor wants to maximizing profit by not employing enough teachers or that competent teachers are not available for employment. The implications of these are that many more teachers should be produced and employed. It is even worse in the universities where many students attend lectures without hearing the lecturer as a result of large class size. Some stand outside the room peeping through the windows, taking notes while standing. Today people are opting for e-learning which is one of the ways of solving large class population.

DEARTH OF INSTRUCTIONAL MATERIAL:

Instructional materials are aids for effective teaching and learning, Nwoji (2002) refers to instructional materials as device that facilitate the transmission to a learner, the facts, skills, attitudes and values which promote understanding and appreciation of concepts, they are the teacher's assistant in the classroom because they facilitates instruction. It is evident that no curriculum can be implemented effectively without due consideration of necessary equipment and materials, teachers employ these material in illustrating and explaining the content of a lesson, and learners interact with them. learning materials generate interest and motivate the learners as well as create opportunity for active participation of the teachers in the course of a lesson (Azikiwe 1994).

There is dearth of instructional materials in our schools, at all levels. One of the problem is cost of the materials because education is inadequately funded many schools lack instructional materials.

TEACHER ISSUES:

The teacher is the major stakeholder in curriculum implementation, curriculum implementation cannot be effectively carried out if the teacher variables such as competence, availability, attitude, dedication and remuneration are faulty. No matter how lofty the educational goals are, how relevant the curriculum is, teachers are the determinants of even success in the school. The importance of qualified and competent teachers is recognized by the federal government of Nigeria (2004) in the national policy where specialist teachers are recommended for particular subjects at the primary school level.

EXAMINATION MALPRACTICE:

Examinational malpractice is one of the major curriculum implementation issues, it has eaten deep into the society and it is so rampant that even parents believe that their children cannot do well in school and external examinations. so they are ready to go extra miles, including buying examination question papers, hiring people to write examinations for their children and bribing the teachers and examiners with expensive gift so that they can assist their children in any possible way to succeed in the examination Ivowi(2005) buttressed this issue of examination malpractice by writing that the number of candidates has continued to overwhelm examiners, and because of poor implementation of curriculum in schools, the battle against examination malpractice is far from being over. Today electronic techniques are employed in cheating in examinations and that shows level of sophistication attained by the student in examination malpractices. The implication of these are:

a) Invalid and unreliable data are supplied to the system
b) Learners became lazy as many do not want to work hard since they can cheat and succeed in the examinations.
c) Indiscipline in schools and the society in general as students do not bother about their academic work rather time is spent planning for different evils, absenteeism, cultism, rape, theft.

Environmental issues and schools curriculum:

Environment is very crucial to the teaching-learning process. For effective curriculum implementation, environment must be adequately organized and arranged. The environment is categorize into physical, social and psychological components. The human and materials resources as well as the interaction and attitudinal behaviours in the classroom make up the classroom environment. Classroom environment may differ from one class to another. It has been found that enriched class room environment influence learning and thus curriculum implementation. Ezeudu (1999), ofomata and phil-eze (2001).

EDUCATIONAL INNOVATIONS.

Innovation is a very broad concept which is addressed by many definitions that vary depending on the specific area of application and point of view adopted (economical, sociological, organizational, technological etc). innovation mostly refer to as an idea, practice or object that is perceived as new by an individual, or other unit of adoption and it matters little whether or not an idea is objectively new as measured by the lapse of time since its first use or discovery (Rogers, 2003). Innovation has to lead to improvement, as argued by Kirkland and sutch (2009), where it is specified that innovation is the application of a new resource or approach that changes social practice, creating some value. This overview presents innovation usually as an international activity implying action (beyond thinking), addressing unsolved problems and benefits through the development or improvement of a product, process or method. Whether incremental, radical or disruptive, innovation is usually defined as a dynamic process. According to clayton Christensen in the innovator's dilemma (2003), incremental refers to limited change leading to continuous improvement, radical corresponds to a major change affecting a key component in the area concerned; and disruptive refers to (incremental or radical) change dismissing the way of doing things previously in place.

Looking more specifically at the concept of educational innovation, OECD/CERI (2010, P.14) build on the basic ideas of novelty and improvement mentioned above, extending it to any dynamic change intended to add value to the educational process and resulting in measurable outcomes, be that in terms of stakeholders satisfaction or educational process and resulting in measurable outcomes, be that in terms of stakeholders satisfaction or educational performance.
According to fullan (2007), significant educational innovation or change in practice must contain three elements:

1. Use of new revised materials (curriculum or technologies)
2. Use of new teaching approaches (teaching strategies or activities)
3. Alteraction of beliefs (pedagogical assumptions) especially when it comes to innovation at school level.

INNOVATION IN NIGERIA EDUCATIONAL SYSTEM

The educational system in Nigeria has witnessed several innovations and transformation since the advent of western education in Nigeria in 1882 (Denga 1986) this foundation of western education in Nigeria was indeed laid by Christian missioneries from sierra-leone, England, ireland, Scotland and later Paris, Rome and the United States of America. Rev. Thomas Birch freeman and Mr. and Mrs. William de graft of western missionary society arrival at badagry on 24th September, 1882 indeed marked the birth of western education in Nigeria. However, The universal primary education which came up in 1975 aimed at ensuring education for all by the year 2000 has already failed due to poor implementation. Recently, the universal Basic Education (UBE) was introduced by the Obasanjo Administration in order to develop and ensure free and compulsory education at the six years of primary education and at the first three years of secondary education known as junior secondary school. According to Idowu (2003), the implementation strategies for this policy include enactment of necessary legislation and articulation of enabling policies, mobilization and sensitization of target groups, adequate funding, regular supervision, monitoring and evaluation of the scheme other strategies includes adequate motivation of teachers for effective teaching, and maintenance of discipline in schools.

BARRIERS TO INNOVATIONS.

There are reasons for the discrepancy between the drive for educational innovation that is observed in some areas, great educational innovation of recent times, and the daily reality of the education system. If we look at the education holistically, as a complete system in charge of sustaining the nations need for educating society members and building their knowledge and expertise throughout their active lifetime, we have to acknowledge that all educational level are interrelated and interdependent. Moreover, education being a system itself is a component of a larger social super system, to which it links in many intricate and complicated ways. As a social institution, education reflects all the values, laws, principles and traditions of the society to which it belongs. Therefore, we need to regard education as a vital, complete, social entity and address it problems, taking into account these relations and dependencies both within the educational system and society.

In turn, if the society supports innovations in education, then it's educational system will continuously and effectively evolve and progress. If it does not, education will stagnate and produce mediocre outcomes. An example of negative socio-cultural impact on education is mercantilism, which is destroying the ultimate purpose of education and consumerism which is degrading institutions of higher education (Feeman and Thomas, 2005; Ng and Forbes, 2009; Abeyta, 2013). Other harmful social and cultural trends exert a powerful influence. These include monetization of education, entitlement, instant gratification, and egotism, which destroys education in general and the development of creativity and innovative spirit of students in particular (Kerby et al, 2004) such grave social issues must be dealt with forcefully.

Second, it is well known that higher education has been historically slow to adapt innovations for various reasons (Hoffman and Holzhuter, 2012; Marcus, 2012; Evans, 1970). Because it is complex (due to cohesion and continuity of service) and labour intensive, higher education is particularly difficult to make more productive (Brewer and Tierney, 2012). Secondary school is even more conservative than Universities because they cater more and more to student's well-being and safety than to their preparation for real life and work (Gibbons and Silva, 2011). Both Secondary and higher education functions as two separate and rather closed systems in their own rights. They are not only loosely connected to the wider world but also suffer from a wide disconnect between high school output measured in graduate learning outcomes and college entrance student expectations.

The system and values of industrial education were not designed with innovation and digital tools in mid. Innovation, weather it is with technology, assessment or instruction requires time and space for experimentation and a high tolerance for uncertainty. Disruption of established patterns to the modus operandi of innovation. We like the fruit of innovation, but few of us have the mettle to run the gauntlet of innovation (Levasseur, 2012). It is paramount, nonetheless, to accept that "Innovation is linked to creativity, risk taking and experimentation" (Brewer and Tiemey, 2012, p.15), which must be a part of the education system.

Innovation is difficult to spread across school and academic because it disrupts the established routine and pushes implementers out of their comfort zone. Technology and Career Readiness becomes a matter of priority and job security, while education begs for innovation, arguments against it often turn to tempting straw man attacks (Heick, 2016). In many instances, innovation in educational institutions does not take priority over pressing routine issues, teachers and school administrator are commonly cautious about a threatening change and have little tolerance for the uncertainly that any major innovation causes. For the innovation to make a sizeable effect, we need an army of implementers together with favorable conditions for the invention to spread and produce a result. Implementers in turn have to be creative and motivated to do their job, they must also have freedom to innovate in the implementation, security on the job to take risk and control of what they are doing, ultimately they need be trusted to do their job right, there must be an innovation-receiving system (Evans, 1070), or a change zone (polka and Kardash, 2013).

POSSIBLE SOLUTIONS

To create innovations, we need innovators and many of them but though innovations is often spark originated in the mind of a bright person, it needs an environment that can nourish the fire. This environment is formed and fed by educational institution, societal culture, and advanced economy. The prospects for improvement in the present state of the Nigerian educational system are very minimal. One of the reason is that of corruption which has made it difficult for people charged with the responsibility of planning and administering school and institutions of learning.

This has often given rise to diversion of resources meant for the development of education in Nigeria.

To reposition the Nigeria Education system to achieve the goals of national education policy, policy makers and implementers should shun policy of primitive accumulation of wealth. Furthermore government has to intensify effort at funding of education so as to meet up with the challenges of today, adequate remuneration to teachers and provision of infrastructure should be intensified in order to attain quality and effective teaching and learning in schools. Above all is the issue of adequate and proper planning, no human Endeavour can be successfully carried out without planning ahead. Therefore all educational programs should be properly and adequately planned before implementation to ensure success.

Recommendation:

1. There is need for concerted effort by stakeholders in education to providing instructional facilities. It is evident that government alone cannot saddle responsibilities of education.

2. Teachers are advice to make use of improvisation where there are no instructional materials, also government should help in providing both visual and audio-visual materials in all secondary schools.

3. The importance of teacher involvement in decision-making and curriculum planning cannot be over emphasized therefore; government should involve teachers curriculum planning and development to give them sense of recognition.

4. Enough funds should be allotted for education so that the payment of teacher salaries, allowances and other entitlements could be made with ease. This will as well make purchase of instructional materials and provision of facilities possible.

5. Government should ensure that ICT facilities are used in all secondary schools, this can be done by providing computers and computers accessories to all institutions. Awareness should be made by informing the parent on the need of ICT training so that everyone can contribute to successful running of ICT programs.

6. Teachers salaries allowances, entitlements and other remunerations should be given to them on time, government should listen to the teachers cry concerning teachers salary structure (TSS). This will definitely motivate teachers to do their best in implementing new curriculum effectively.

Conclusion:

This presentation tried to discuss curriculum issues as they pertain to different levels of education in Nigeria the issues in question are implementation of school curriculum, environment and communication technology and innovation, reforms and change and the school curriculum.

From the discussion, it is evident that Nigeria has a long way to go in terms of curriculum development and implementation, in Nigeria, the school curriculum is still heavily burdened with a lot of setbacks ranging from policy formulation to curriculum implementation. The issue is not formulating polices but empowering the implementers to successfully execute the policies. There is need for values reorientation so as to inculpate in the learners the right attitudes and values and the acceptable norms in Nigeria.

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POLICY PRIORITIES AND CHALLENGES OF IMPLEMENTATION OF INNOVATIONS AND CURRICULUM DEVELOPMENT FOR TECHNOLOGY EDUCATION IN NIGERIA.

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Abstract
The study was conducted to ascertain the policy priorities and challenges of implementation of innovations and curriculum development for technology education in Nigeria. The study was a survey research in which data were collected through a 20-item questionnaire administered on 100 respondents which were purposely sampled. 30 technology education administrators and 70 technology education teachers from, Universities, Colleges of Education, and polytechnics who offer technology education in Kaduna, Benue and Niger state. Data collected were analysed using mean, standard deviation and z-test. Findings of the study revealed the policy priorities of government towards technology education to include Standard workshop, Adequate student teacher ratio, Quality teachers, Quality management, Internet access, Research and training services, enhancing staff training, providing quality assurance, Allowing private sector entry through private public partnership (PPP), Electricity supply. it further revealed the challenges of implementation of innovations and curriculum development for technology education. the study suggested that government should provide funding for standard aligned professional development process that will train and retain the students strategically meeting the teaching and learning needs for a knowledge-based economy, provide resources and technological infrastructure for research and creation of centres of excellence that encourage interdisciplinary research for best practices. Promote access to information management systems – hardware and software for meeting the learning needs of the student generation.

Keywords: *Policy priorities, Challenges of implementation, Innovations, Curriculum development, Technology education.*

Introduction

Technology education is a type of education that is critical to socio economic development because it develops capacity, provides requisite knowledge and skills, broadens sense of awareness, and enhances confidence and sense of judgment (Abd-El -Aziz, 2013). Technology education is the type of education that equips students with skills that can enable them to engage in productive livelihood. Technology education is generally designed to bring about industrial development which in turn is a key player in economic development (Silvius and Bohn, 2016) Technology education as stated in the National Policy on Education (FRN, 2004), is a type of education whose fundamental purpose is to produce manpower for technological development necessary for economic growth. In Nigeria Technology Education is offered in Technical colleges, universities, monotechnic, polytechnics and colleges of education. Technology Education is an indispensable part of any modern society, and can unfold a lot of 'not-realized' dreams of education institutes, education, and management. The education field is undergoing drastic changes because of different factors such as emerging technology innovation, student mobility, and government regulations. Suppliers to this industry are facing stiff pressure because of the high cost of books, low cost interactive web-based courses, and surge in the use of personal devices. With easy internet access, the popularity of smartphone use, and social networking, the field of education has to grab opportunities for content delivery of educational material in the form of eLearning. Organizations should realize the need for virtual colleges and classrooms. The never-stopping tech evolution necessitates easily accessible as well as reliable web-based education.

Technology therefore, encompasses scientific knowledge that must be possessed by man. The reason is that, its equipment, devices and apparatus are quite beneficiary to man. For instance, the uses of electro-mechanical devices, sophisticated gadgetries and computerized equipment have made life easier and comfortable. This later explanation of technology portrays technology as all activities carried out using man-made apparatus, machines and devices for the purpose of simplifying the task of living in a constantly dynamic environment. With all these benefits of technology, Nigeria is yet to emerge as an actor in the global scene of technological development. A lot is yet to be done individually or collectively to really encourage Nigerians to accept technology as part of their culture and not as an alien to it (Usoro and Edu,2016). Though Nigerians wholeheartedly appreciate products of technology, they are yet to change their attitude towards technology related program. For instance, technology education program, the only known means of training the needed manpower to man the different phase of Nigeria's technological sector is yet to receive priority attention from the authorities. Even the trainers and the trainees themselves involved in technology education program are no longer committed to the productive aspects of their program in order to fully develop the learners' problem-solving abilities. It is the desire of every nation including Nigeria to be technologically developed and self-reliant. To be technologically developed and subsequently become self-reliant, a nation must utilize technology education as a foundation. To this end many countries have actually formulated policies and devised strategies necessary to aid them aspire to achieve advantageous positions. Government policies are rules/regulations or guidelines supporting the administration or smooth running of an organisation to achieve a set objective or goals (Adetunji, 2015). Government policies have become a very important factor as they help in terms of which direction should be followed by the subordinates and how It was on this premise of policy that vision 2020 was born. It is a vision in which Nigeria is aspiring to become one of the 20th most developed countries in the world by the year 2020. Unequivocally, it is the view of this paper that technology education is the vehicle to drive vision 2020 to its realization. The essence is to re-direct the attention of the government towards Technology Education in order to give it the necessary support. For this to be realised we need to reintegrate modern trends into technology education curriculum, for government policies to be carried out effectively technology educations administrators need to be professionals.

Technology Education administrators are the administrative head of school that are referred to as rectors in polytechnic, provosts in colleges of education and vice chancellors in the universities. According to Ghaffar, *et al.* (2012), the primary functions of school administrators include the provision and maintaining a healthy environment for teaching and learning as well as coordinating school resources for educational goal attainment. School administrators are considered as stakeholders in education that coordinates the processes of curriculum development, implementation and innovation with other stakeholders. Nzeadi (2011) noted that, school administrators have better understanding of issues and challenges in curriculum development, implementation and innovation processes. Hence, Curriculum is all about experience required of a child for all round development since the organization of schooling and further education had long been associated with the idea of curriculum. Curriculum is a particular form of specification about the practice of teaching. It is not a package of materials or syllabus of ground to be covered rather it is a way of translating any educational idea into a hypothesis testable in practice. It invites critical testing rather than acceptance (Stenhouse, 2005). Furthermore, curriculum is said to be a specification about the practice of teaching which involves pragmatic efficacy of the learners' experiences. Experience as a general concept comprises knowledge of or skill of something or some events gained through involvement in or exposure to that thing or event. In this wise, curriculum is an important element of education in which overall objectives of education depend largely on the nature of the curriculum (NERDC, 2004). This curriculum can be sincerely carried out by the technology education teachers.

Technology Education teacher is an individual who inspire and educate students in the technological method or a specific field of Technology education like auto mech, building, electrical/electronics, metal work and wood work technology education. Technology education teachers are entrusted with the transmission to learners of society's beliefs, attitudes and deontology, as well as of information, advice and wisdom, and with facilitating learners' acquisition of the key knowledge, attitudes and behaviours that they will need to be active in society and the economy. Today, the transition from industrial arts to technology education brings enormous challenges to the profession. To manage the process of this change, the profession must create solutions to resolve discrepancies between the programs and philosophies of technology education and current practices, redefine content direction to improve the public's perception and understanding of technology education, hence the need to investigate the policy priorities and challenges of implementation of innovations and curriculum development for technology education in Nigeria.

Statement of the problem

The curriculum for technology education programmes that is meant to train students of various institutions of learning for the purpose of maintaining technological equipment has remained obsolete with little practical skills and modern technological trends inclusion, this has affected them with the latest and current technological innovations and breakthrough. The gaps created between curriculum and new technological innovations have made the needed skills for effective maintenance and repairs of these new breads of technological equipment to elude the graduates of technology education. The outcomes of these has created unemployment or are sometimes underemployed while this new technological equipment suffer disrepair or have the new systems replaced by the sophisticated brands that the new ones are meant to improve upon. Yet some are completely grounded just barely into their expected service lives because of lack of competent personnel for effective maintenance. the deficiency in the maintenance skills among technology education, students resulting from the inadequacy of the curriculum content in technical and technological institutions has resulted to the production of unskilled graduates who are incapable of carrying out the required maintenance in the modern technological innovations equipped with high tech facilities As measures to keep technology education and training in tune with the current technological innovations the knowledge and skills given in our schools, the courses and curricular must be reviewed, enriched and updated regularly in line with changes that are taking place, thus it was imperative to investigate policy priorities and challenges of innovations and curriculum development for technology education in Nigeria.

Aim and objectives of the study

the aim of the study was to investigate the policy priorities and challenges of implementation of innovations and curriculum development for technology education in Nigeria Specifically, the study investigated:

1. The policy priorities with respect to curriculum development for technology education in Nigeria.
2. The challenges of implementation with respect to curriculum development for technology education in Nigeria.

Research Question

The following research questions were posed to guide the study.

1. What are the policy priorities with respect to curriculum development for technology education in Nigeria?
2. What are the challenges of implementation with respect to curriculum development for technology education in Nigeria?

Research Hypotheses

The following null hypotheses were tested at .05level of probability:

HO_1: There is no significant difference in the mean responses of Education administrators and technology education teachers on policy priorities with respect to curriculum development for technology education in Nigeria

HO_2: There is no significant difference in the mean responses of Education administrators and technology education teachers on the challenges of implementation with respect to curriculum development for technology education in Nigeria.

Methodology

The study was a survey research design. The design was used to gather opinion on the maintenance practices among automobile technicians in Nigeria. Olaitan *et al* (2000) defined survey research design as one in which a group of people or items is studied by collecting and analysing data from people or items considered to be representative of the entire group. A purposive sampling technique was used to select the study areas which are Kaduna, Benue and Niger state, because of institutions where technology education is taught, population of 200 respondents purposively sampled from these areas were chosen because they have high concentration and cluster of automobile maintenance, service laboratories and workshops in which modern vehicles equipped with high tech facilities are maintained. The population of the study was 100 respondents comprising of 30 Education administrators and 70 technology education teachers spread across Kaduna, Benue and Niger state. A 20 items questionnaire structured on a 5-point Likert scale was used to collect data from the respondents. The questionnaire was structured to indicate the degree to which respondents agree to item as Strongly Agree (SA), Agree (A), Undecided (UN)Disagree (D) and Strongly Disagree (SD). The response category was assigned numerical values as 5;4;3;2 &1. The questionnaire was validated by three experts from College of education Minna, Kaduna polytechnic, and federal university of technology Minna and Corrections and observations made by experts were effected before the administration of the instrument. The weighted mean (X) and Standard Deviation (SD) were used to answer the research questions. Therefore, items with mean score below 3.00 were regarded as disagreed while those with means score at 3.00 and above were regarded as agreed. The t-test statistics was used to test the hypotheses at .05 level of probability. The t-critical (t-table) value for accepting or rejecting the null hypothesis was ±1.98.

Results

Research QUESTION 1

What are policy priorities with respect to curriculum development for technology education in Nigeria?

TABLE 1 Mean and standard deviation of respondents on policy priorities with respect to curriculum development for technology education in Nigeria?

S/NO	ITEM	Education Administrators			Technology Education teachers		
		X	SD	DEC	X	SD	DEC
1	Standard workshop	3.20	.76	A	2.83	.59	A
2	Adequate student teacher ratio	3.43	.63	A	3.30	.53	A
3	Quality teachers	2.90	.76	A	3.57	.59	A
4	Quality management	3.23	.70	A	3.27	.70	A
5	Internet access	3.30	.70	A	3.57	.70	A
6	Research and training services	3.33	.69	A	2.90	.94	A
7	Enhancing staff training	3.14	.64	A	3.23	.74	A
8	Providing quality assurance	3.30	.63	A	3.13	.64	A
9	Allowing private sector entry through private public partnership (PPP)	3.39	.65	A	3.37	.79	A
10	Electricity supply	2.58	.72	A	2.77	1.06	A

KEY: X= mean SD= Standard Deviation

Analysis on table1 shows that 15 of the items presented had their weighted mean values ranged from 2.58- 3.57. These values are above the cut of point of 3.00 who implies that the respondent agreed with policy priorities with respect to curriculum development for technology education in Nigeria.

Research Question 2

What are the challenges of implementation with respect to curriculum development for technology education in Nigeria?

TABLE 2 Mean and standard deviation of respondents on the challenges of implementation with respect to curriculum development for technology education in Nigeria.

S/NO	ITEM	Education Administrators			Technology Education teachers		
		X	SD	DEC	X	SD	DEC
11	Lack of political will.	3.06	.72	A	2.87	.640	A
12	Lack of adequate consultation.	3.20	.68	A	3.33	.724	A
13	Lack of technical and management capacity	2.60	.86	A	2.93	.594	A
14	Societal negligence	2.79	.90	A	2.73	.799	A
15	Consumption of foreign practices	2.77	1.00	A	2.87	.743	A
16	Inadequate Funding	2.96	.73	A	2.73	.884	A
17	Lack of commitment	3.16	.76	A	2.67	.617	A
18	Conflict of interest	2.70	.97	A	3.00	.535	A
19	Electronic Lack of continuity in monitoring policies and programmes.	3.21	.71	A	3.07	.458	A
20	Corrupt practices	3.45	.60	A	2.53	.640	A

The data analysed in table 2 revealed that all the items had their mean values ranged from 2.60 – 3.45. Since the cut off value is 3.00, it indicates that the respondents agreed to all the challenges of implementation with respect to curriculum development for technology education in Nigeria.

Research Hypothesis 1

HO_1 There is no significant difference in the mean responses of Education administrators and technology education teachers on policy priorities with respect to curriculum development for technology education in Nigeria.

TABLE 3 t-test analysis of mean responses of respondents on responses of Education administrators and technology education teachers on policy priorities with respect to curriculum development for technology education in Nigeria.

S/NO	ITEM STATEMENT	Education Administrators		Technology Education teachers				
		X	SD	X	SD	t-cal	t-tab	Remark
1	Standard workshop	3.20	.76	2.83	.59	0.44	1.98	NS
2	Adequate student teacher ratio	3.43	.63	3.30	.53	.33	1.98	NS
3	Quality teachers	2.90	.76	3.57	.59	.66	1.98	NS
4	Quality management	3.23	.70	3.27	.70	0.82	1.98	NS
5	Internet access	3.30	.70	3.57	.70	1.00	1.98	NS
6	Research and training services	3.33	.69	2.90	.94	0.78	1.98	NS
7	Enhancing staff training	3.14	.64	3.23	.74	.53	1.98	NS
8	Providing quality assurance	3.30	.63	3.13	.64	0.79	1.98	NS
9	Allowing private sector entry through private public partnership (PPP)	3.39	.65	3.37	.79	0.56	1.98	NS
10	Electricity supply	2.58	.72	2.77	1.06	.055	1.98	NS

The t-test analysis from table 3 revealed that all the items had their t-calculated (t-cal) values less than the t- table (t-tab) values of ± 1.98. This implies that there was no significant difference in the mean rating of the responses of the Education administrators and technology education teacher's policy priorities with respect to curriculum development for technology education in Nigeria

HO_2 There is no significant deference in the mean responses of Education administrators and technology education teachers on the challenges of implementation with respect to curriculum development for technology education in Nigeria.

TABLE 4 t-test of mean responses of respondents on the challenges of implementation with respect to curriculum development for technology education in Nigeria.

S/NO	ITEM STAEMENT	Education Administrators		Technology Education teachers				
		X	SD	X	SD	t-cal	T-Tab	REMARK
11	Lack of political will.	3.06	.72	2.87	.640	0.82	1.98	NS
12	Lack of adequate consultation.	3.20	.68	3.33	.724	0.67	1.98	NS
13	Lack of technical and management capacity	2.60	.86	2.93	.594	0.83	1.98	NS
14	Societal negligence	2.79	.90	2.73	.799	1.24	1.98	NS
15	Consumption of foreign practices	2.77	1.00	2.87	.743	1.22	1.98	NS
16	Inadequate Funding	2.96	.73	2.73	.884	0.88	1.98	NS
17	Lack of commitment	3.16	.76	2.67	.617	0.34	1.98	NS
18	Conflict of interest	2.70	.97	3.00	.535	0.77	1.98	NS
19	Lack of continuity in monitoring policies and programmes.	3.21	.71	3.07	.458	0.63	1.78	NS
20	Corrupt practices	3.45	.60	2.53	.640	0.82	1.98	NS

The t-test analysis from table 4 revealed that the items had their t -calculated (t-cal) values less than the table (t-tab) value of ± 1.98. Thus, implies that items were no significant difference in the means rating of the response of the respondent on What are the challenges of implementation with respect to curriculum development for technology education in Nigeria.

Discussion of Findings

The findings of this study emerging from table 1 indicate the policy priorities of technology education with respect to curriculum development. Findings show that government priorities include Standard workshop, Adequate student teacher ratio, Quality teachers, Quality management, Internet access, Research and training services, enhancing staff training, providing quality assurance, Allowing private sector entry through private public partnership (PPP), Electricity supply. This is not surprising given the policies of government towards technology education. Okoye (2012) stressed that for technology education to grow, it must have adequate facilities. Similarly, Adamu and Enan (2014) explained for Technology education to grow and produce the needed graduates all the facilities mention in its curriculum must be adequate and functional.

Findings in table 2 revealed the challenges of implementation with respect to curriculum development for technology education to include Lack of political will. Lack of adequate consultation, Lack of technical and management capacity, Societal negligence, Consumption of foreign practices, Constraints of funding, Lack of commitment, Conflict of interest. (UNESCO, 2014) stated that the challenges affecting the progress of Education in Africa includes, lack of Lack of political will. Lack of adequate consultation, Lack of technical and management capacity in carrying out the said objectives.

Conclusion

Technology education being program meant to give practical skill to an individual is a good tool to achieve economic development in any society. Similarly, educational policies is a pursuit of

Nigeria becoming one of the best 20 economies in the world can be realized through technology education as seen from this paper. Addressing problems like, Standard workshop, Adequate student teacher ratio, Quality teachers, Quality management, Internet access, Research and training services, enhancing staff training, providing quality assurance, Allowing private sector entry through private public partnership (PPP), Electricity supply. Therefore, government policies is a quality strategy that is dependent on the acceptance and involvement of everybody involved in its implementation, as suggested by Adetunji (2015) in the literature review and supported by the empirical findings. Likewise, the implementation process will require a more conducive organisational culture for quality and improvement. As Modebelu and Joseph (2012) observed, technology education are very complex organisations where knowledge is fragmented into specialised areas and educators are engaged in the highly individual activity of teaching. The informants agreed that bringing about changes in such a complex system requires commitment and the acceptance of a holistic, integrated approach to, so that it permeates throughout the institutions and becomes everyone's responsibility. The problems include Lack of political will. Lack of adequate consultation, Lack of technical and management capacity, Societal negligence, Consumption of foreign practices, Constraints of funding, Lack of commitment, Conflict of interest.

Recommendations

Based on the findings of the study, the following recommendation were made:

1. Private individual/companies should consist in providing modern equipment to be use by technology education practioners.
2. Curriculum developers should be experts who should lay more emphasis on the development of up-to-date practical skills.
3. Training courses and seminars should be organized at intervals to update and upgrade the work skill of technology education administrators.
4. Develop and provide funding for standard aligned professional development process that will train and retain the students strategically meeting the teaching and learning needs for a knowledge-based economy.
5. Provide resources and technological infrastructure for research and creation of centres of excellence that encourage interdisciplinary research for best practices.
6. Funding of education should be the joint responsibility of government and private individuals.

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CURRICULUM ISSUES IN SCIENCE EDUCATION: BRIDGING B.ED PRIMARY EDUCATION - SCIENCE AND PRIMARY SCHOOL SCIENCE CURRICULA

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Abstract
This paper overviewed science education curriculum in Nigeria with focus on Basic (Primary) Science. Concepts of ideal science education curriculum and the teacher's role in its development were discussed. The state of B.Ed. Primary Education - Science and primary school science curricula in Nigeria alongside implications on science education in the 21st century were critically reviewed. From the discourse, it was evident that some gaps exist between the primary teacher education programmes laudable goals and the actual curriculum in use, achieving Basic Science aims and objectives in the primary school. It was concluded that for effective Primary (Basic) Science teaching to thrive, effective teacher education programme with suitable balanced curriculum is needed. Therefore, bridging B.Ed. Primary Education - Science and primary school science curricula is indispensable for sound science education in Nigeria and should be directed by National Universities Commission (NUC) for compliance in all degree awarding institutions in Nigeria.

Keywords: Science Education Curriculum, Ideal Science Education Curriculum, B.Ed. Primary Education - Science Curriculum, Primary School Science Curriculum, and Basic (Primary) Science.

Introduction
The health and wealth of any nation are anchored on its education. The success of any education depends largely on the quality of its curricula and teachers. As rightly observed by Mbachu (2011), the teacher is seen as an agent of innovation and the fulcrum on which the success or failure of any education rotates. That is why Nwogwu (as cited in Ayua, 2009) submitted that the teacher is an indispensable factor in the school system. Without the effective teacher, even if all other things are provided, it would be very hard, if not impossible, to reach the desired aims and objectives of the school. If we believe in the quality of education system that would result in rapid social, economic, scientific and technological development, we should be concerned with what and who teaches in our schools. This is because no education system can rise above the quality of its teachers (Akinwumi, 2007) and it's curricula. There is therefore the need for quality teacher education programme suitable for the educational level it should serve.

Teacher education according to Afe (as cited in Ominyi & Odoemnam, 2011) is the form of education which is properly planned, systematically and relevantly tailored and applied for the cultivation of those who will teach. To Osuji (2009), it is a professional education of teachers towards attainment of attitudes, skills, and knowledge considered desirable so as to make them effective and efficient in their work in accordance with the educational goals and needs of the learner and the society at large. The structure, level and quality of teacher trainers of one teacher education programme may differ from another. But they likely share the following in common; general education, academic preparation (teaching subject(s), professional studies, educational pedagogy and practical teaching. Teacher education could be either pre-service or in-service.

Farrant (1980) revealed that teacher training in Nigeria was pioneered by the European missionaries and the mode of training was basically informal/apprenticeship. This however, became formalized and over time has undergone several developments. In the National Policy on Education, the goals of teacher education in the 21st century according to the Federal Republic of Nigeria (FRN) (2013), are to; produce highly motivated, conscientious and efficient classroom teachers for all levels of educational system, encourage/further the spirit of enquiry and creativity in teachers, help teachers to fit into social life of the community and the society at large and enhance their commitment to national goals, provide teachers with assignment and make them adaptable to changing situations and enhance teachers' commitment to teaching profession. The attainment of these goals depends on the nature of programmes student teachers are exposed to both within and outside teacher training institutions. However, there seems to be a missing link between policies and practices.

This paper therefore reviewed science education curriculum (basic science) in Nigeria, ideal science education curriculum and the teacher's role, state of B.Ed. Primary Education - Science and primary school science curricula in Nigeria, implications on science education in the 21st century, and conclusion and recommendations for bridging B.Ed. Primary Education - Science and primary school science curricula.

Overview of Science Education Curriculum (Basic Science) in Nigeria

Western education introduced into Nigeria by the European missionaries, lacked the aspect of science at first. It was much later in the colonial and post-colonial periods that traces of science education started emerging. According to Olu (1987) and Onwuka (1996), long before the 1969 National Curriculum Conference, the science curriculum for secondary schools was designed by the West African Examination Council (WAEC) partially to satisfy the requirements for its external examinations. The syllabus was characterized by typical approach in the structure of the content. Science was then presented as bits and pieces of information without conceptual relationships. Abah and Agogo (2011) lamented that science education in Nigeria has suffered both in areas of curriculum planning and implementation. They stated hat the method of teaching science was the defected lecture method with little or no demonstration of experiment to enable learners learn science by doing science. In addiction, the mode of assessment in science subjects was nothing more than the recall of facts. It was lopsided and thus paid little or no attention to practical work besides lack of involving students in the teaching and learning processes. This kind of science education was unsatisfactory to Nigerians. Consequently, between then and now, several science curricula development efforts have been made to improve science education in Nigeria.

A science education curriculum is the sum total of all the experiences through activities and experimentation which the learner acquires at school. The school being a part of the society is charged with the responsibility of educating the young to fit into the society. It does this by offering the knowledge, skills and attitudes that best educate the young, which are spelt out in the curriculum. In science, the experiences and activities offered to the learners are in the form of classroom and laboratory teaching, science fairs, quizzes, club activities, field trips and educational tours which help to achieve the purpose of science education and education in general.

Odoh, (2007) stated that science was eventually introduced in the school curriculum between 1895 and 1920 as Physiology, Nature Study and Botany (only Biology related) in a few of the mission schools (the Church Missionary Society Grammar School Lagos, Hope Wardell Training Institute Calabar, St Gregory's College, Lagos and Baptist Training College Ogbomoso etc.). The teaching of science only began in full swing in the 1920s following the recommendation of an African Education Commission under the sponsorship of the Phelps-Strokes Fund of America. After the Nigerian independence in 1960, the West African Examinations Council modified science curriculum. Seeing the crucial role of science in national development, many science curriculum programmes were developed to lay a solid foundation of science education at the primary education level. These included: Primary Education Improvement Programme, African Primary Science Programme, Primary Science and Mathematics Project, National Education Research Council, Federal Government Core-curriculum Development Project in Primary School, Yoruba Six Year Primary Science Project, Bendel State Primary Science Project. Between then and now, progress has been made yet science education in Nigeria is not where it should be. Nigeria does not need just a science education curriculum but an ideal, suitable and functional one.

Ideal Science Education Curriculum and the Teacher's Role

From the foregoing, many efforts have been made in developing the science education curriculum that would serve the aspirations of learners and meet the national goals of education in Nigeria. However, it should be noted that the ideal science curriculum is one which keeps pace with the contemporary changes in the society; a science curriculum that would help to address challenges such as: poverty, hunger, deadly sicknesses, deforestation, social vices, environmental degradation, politics and election rigging, crime, gender issues, global warming and its ardent effects, over population, unemployment, insecurity among others (Ayua & Gamat, 2018). An ideal science curriculum is one that is child centred, activity based, explorative and entrepreneurial in nature. An ideal science education curriculum should be such that its teacher education programmes' curricula are well linked with the corresponding levels of education they are to serve.

In developing an ideal science curriculum, the science teacher as a curriculum implementor needs to use classroom practical experiences to make suggestions where necessary to the government and the bodies responsible for curriculum planning, development and improvement for needed adjustment. This will pave way to effective teaching and learning of science and thus the goals of science education would be better attained.

State of B.Ed. Primary Education - Science and Primary School Science Curricula in Nigeria: Implications on Science Education

Nigeria is placing emphasis on science and technology education as a means to national development. Thus, in the National Policy on Education (FRN, 2013), the goals of primary education are outlined, part of which is the laying of sound basis for scientific and reflective thinking. The document adds that material and man power shall be provided such that the teaching/learning of Basic (Primary) Science shall be by practical, exploratory and experimental methods. However, there seems to be some gaps between these goals and the actual situation on ground.

In a study on identification and analysis of topics which teachers perceive as difficult to teach in primary science. Njoku (2005) collected data from 120 primary science teachers using a 4-point rating scale and mean score and standard deviation for data analysis. It was found that 17(35%) out of 48(65%) Basic (Primary) Science topics were rated difficult. Lack of teaching resources but more of imbalanced training of teachers were advanced as reasons for the difficulty. The 35% difficult topics to teach were Physics, while the 65% were Biology, Chemistry, and Agricultural Science related.

Similarly, Akinsola, lawal and Oyedokun (2007) in their study found that 39% of Basic (Primary) Science teachers ere unqualified and thus the quality of teachers teaching science in primary school was inadequate and unsatisfactory. Ayua (2011) in another study found that among the few Basic (Primary) Science teachers, only 25% of them could improvise. The rest (75%) do not, and the reason was that they lack professional training in the acquisition of basic practical skills for improvisation. This implies that primary science teacher education should ensure acquisition of basic practical skills for improvisation and increase production of teachers who will teach primary science effectively using activity based methods. Primary school science teachers are inadequate to serve the ever increasing enrolment of pupils into primary schools. Also, teachers are rather theorizing primary science teaching as against its expected experimental teaching methods and goals.

Besides, Ayua (2012) assessed serving teachers expectations in Makurdi on effective primary science teacher education programme. Two research questions and one hypothesis guided the study. A random sample of 60 out of the 294 primary science teachers from 15 out of the 84 primary schools was used. Primary Science serving teachers' questionnaire (PSSTQ) with 0.89 Chronbach reliability coefficient, curriculum for primary science (B.Ed.) and primary school were used for data collection. Percentage and chi-square were used for data analysis. Results showed a significant imbalance between the two curricula leading to ineffective teacher production and performance. Thus, B.Ed. Primary Science (BSU) science-related core courses stood at 44% Biology, 56% Chemistry and 0% Physics as against 44% Biology, 16% Chemistry and 40% Physics in the primary school science curriculum (FME, 2007). Yet, a baseline survey of the curricula (as reflected in the departmental students' handbooks for 2018/2019 academic session) among other institutions running similar programmes across Nigeria shows that this is one of the richest curricula. It is commendable that the said curriculum has been beefed up with Geography and Physics contents.

The reasons for the imbalance could be that those who drew the curriculum for B.Ed. Primary Science teacher education programme failed to take into cognizance the primary school curriculum which the teachers are supposed to teach upon graduation. Besides, the continued existence of the discrepancy is likely because the primary science teacher education programme has not been reviewed to take care of this weakness. However, it should be noted that if this imbalance between the two curricula left to continue, there would be a continuous production of lopsided primary science teachers who will continue to lay a lopsided foundation for primary science in particular and science education in general.

According to Joint Admissions and Matriculation Board-JAMB (2019), B.Ed. Primary Education Studies is offered in 51 degree awarding institutions across Nigeria. B.Ed. Primary Education Studies is synonymous with Elementary Education, Pre-Primary and Primary Education, Primary and Elementary Education, Nursery and Primary Education, Early Childhood and Primary Education, and Early Childhood Education. A baseline survey of the B.Ed. Primary Education Studies programme across some of the 51 institutions using interview (both lecturers and undergraduates) and analysis of the curricula (as reflected in the departmental students' handbooks for 2018/2019 academic session) revealed that most of the institutions do not offer the course with a teaching subject. Some, only indiscriminately handpick a few topics across a few subjects as electives. Only a few institutions offer it with option in teaching subjects including Primary (Basic) Science. Yet, majority of this kind of teachers are found in Nigerian public primary schools and stationed in a class to teach all subjects including Basic Science. Can this lopsided teacher-training results in laying the expected sound and solid foundation upon which the future of science education in Nigerian could be anchored? It is doubtful! It is confusing producing and parading such teachers as specialists in nursery and primary education without corresponding teaching subjects in the primary schools they should best serve. The unabated prevalence of this kind of teacher education poses a threat to the survival and future of science education in Nigerian.

In the Basic Science (a theme in Basic Science and Technology subject) curriculum for primary schools (lower and middle basic education), the FME (2014) outlines 42 topics to be taught and learnt from primary (P) one to six (P1=5, P2=7, P3=7, P4=8, P5=7 and P6=8). Out of the 42 Basic Science topics; 43% are Biology based, 26% are Geography related, 17% are Physics inclined and 14% are Chemistry tailored. This clearly shows a negative correlation between B.Ed. Primary Education Studies (without teaching subject options) and primary school curricula. This means Nigerian teacher education under this programme is training teachers to teach nothing at the primary schools. So, what makes them specialists here? This implies that there would be no solid foundation suitable for building a sound and functional science education needed for scientific and technological advancement in the 21st century.

Worthy of emulation are a few out of the 51 degree awarding institutions in Nigeria, which offer B.Ed. Primary Education Studies with teaching subject options. Thus, the curriculum for those with Primary (Basic) Science option contained 30 science oriented courses with 30% Biology, 26% Chemistry, 20% Primary Science Methods, 10% Geography, 8% Physics and 6% Mathematics. This kind of teacher education curriculum has a strong positive relationship with the one for science at the primary school. This implies that except this is improved upon and replicated in the about 80% of the 51 institutions offering B.Ed. Primary Education Studies without teaching subject options, there would be a gross imbalance between the two curricula. Also, the foundation to build the kind of science education required to pilot scientific and functional advancement in the 21st century will be a mirage.

Conclusion

From the discourse, it is evident that some gaps exist between the primary teacher education programmes laudable goals and the actual curriculum, producing ill-trained and lopsided teachers. This teachers in turn constitute impediments to achieving Basic Science aims and objectives in primary school. However, it should be noted that there will be no effective Primary (Basic) Science teaching without effective teacher education programme with suitable curriculum. Therefore, bridging the gap between B.Ed. Primary Education - Science and Primary School Science Curricula is necessary for sound science education in Nigeria.

Recommendations

To bridge the gap between B.Ed. Primary Education - Science and Primary School Science Curricula, it is recommended that stake-holders in education in conjunction with science teacher educators and curriculum experts should improve teacher education curriculum having a strong positive relationship with the one for science at the primary school. As a directive from the NUC, this improved curriculum should be complied with in all the degree awarding institutions in Nigeria offering B.Ed. Primary Education Studies without teaching subject options.

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IMPROVING CREATIVITY AND ACADEMIC PERFORMANCE OF SECONDARY SCHOOL STUDENTS IN ORGANIC CHEMISTRY CONCEPTS THROUGH CONTEMPORARY TEACHING STRATEGIES

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Abstract

The study investigated the impact of Contemporary Teaching Strategy on Creativity and Performance of secondary school students in Organic Chemistry Concept. Two objectives, research questions and null hypotheses were generated to guide the study. The design of the study was a quasi-experimental pretest and posttest control-group design, involving one experimental group and one control group. The experimental group was exposed to Contemporary Teaching Strategy while the control group was taught using Lecture method. A sample size of 120 SSII Chemistry students selected from two secondary schools in Katsina Metropolis was used as the study sample. The experimental group had 57 students while the control group had 63 students. The instruments used for the study was a twenty five-item multiple choice Organic Chemistry Performance Test (OCPT) and Jamal Abedi creativity test (JACT) which were validated and used for data collection. Dependent and Independent t-test statistics were used for data analysis. The result showed that students exposed to Contemporary Teaching Strategy performed significantly better than those taught with lecture method. And the creativity and its component (fluidity, expansion, originality and flexibility) of the experimental group was also duly enhanced after treatment. The recommendations made was that Contemporary Teaching Strategy, if effectively utilized and applied by teachers in the instructional delivery in chemistry could significantly enhance Creative/Critical thinking of students which in turn will enhances their innovation skills for innovative solutions to existing and future problems. It was also recommended that other strategies can be integrated together rather than the ones used in this study to enhance self-confidence, motivation, critical thinking skills and other 21st century skills.

Keywords: Contemporary Teaching Strategy, 21st Century Skills, Creativity and Academic Performance

Introduction

A significant fortune of a country lies on its human resource. A country can develop and thrive if the human resources bolster it, both in term of quality and quantity. The human asset is a necessity, with the goal that the improvement of it's quality ought to be a primary focal point, particularly in confronting the 21st century of learning. The 21st-century scientist must have a skill set that allows him or her to probe and explore problems, to find and critically evaluate information, to work productively as a member of a team, and to effectively communicate research findings to others in order to compete nationally and internationally; these skills can be referred to as the 21st century skills (Andrew & Eyles, 2010). According to Rich, (2010) and Greenstein (2012), the term "21st-century skills" is generally used to refer to certain core competencies such as collaboration, digital literacy, contextual learning skills, creativity and innovation skills, critical thinking, and problem-solving that advocates believe schools need to teach to help students thrive in today's world.

Education the 21st in century is about giving students the skills they need to succeed in this new world, and helping them grow the confidence to practice those skills. With so much information readily available to them, it focus more on making sense of that information, sharing and using it in smart ways. Holbrook (2011) suggests that science education is an integral part of education and the goals of education are the goals of science education. According to Okeke (2007) as cited in Odo and Igwe (2016), Science education embodies all education processes aimed at providing unlimited opportunities for learners to understand and utilize necessary knowledge, skills and attitudes required to operate effectively in a scientific and technology society. Through quality science education, we can support and advance relevant 21st-century skills, while enhancing science practice through infusion of these skills into Science Curriculum.

A main goal of chemistry education is to guide students in building mental models of chemical phenomena and ensure close congruence to scientifically accepted models, as their higher-order thinking skills are unfolded and challenged. As opined by Hanson (2017), one area of chemistry where students demonstrate a lot of challenges with respect to building authentic mental models is organic chemistry. Adequate understanding of organic chemistry is a prerequisite for many graduate and professional programs in human care. It is a key to the development of new products in the society and for improving on many more of them that we have become dependent on. It is the basis for the production of food flavors, plastics, clothing, car tyres, fuels, cement, pharmaceuticals and house cleaning agents. It is also important in the investigation and in effective function of security agencies. Thus Chemistry education and Organic chemistry education in particular should be taught with pedagogy that supports the three major objectives of Science education.

For several years, teaching strategies has become more complex where the focus shifted from the teachers as the source of knowledge to the students as the focus of learning. Moreover, in the new era of teaching pedagogy, teachers are challenge to uplift new methods and strategies that will answer the rising needs of the students such as Contemporary Teaching Strategies, CTS (Pana & Escarlos, 2017). Contemporary meaning "integration" or "occurring at the same time" simply implies the integration of several teaching strategies that promotes the 21st century skills. For the study, Cooperative Teaching Strategy, Inquiry Based Strategies and Activity Based Strategies served as the parent strategies which consists of several sub-categorized strategies. One strategy that falls under Cooperative Teaching Strategy is the Think-pair-share. The think-pair-share strategy propounded by Lyman (1981) is an active learning strategy that engages students with materials on an individual level, in pairs and finally as a large group. It actually consists of three steps: the think time, (students are allowed to reason independently of the teacher and other students after being given a problem to solve), the pair time (students are allowed to pair with designated seat mates) in order to bring their ideas together, then finally the share time (students are called out randomly) to present their findings and solutions to the problem before the entire class. According to Ifamuyiwa and Onakoya (2013) this strategy enhances students' performance as it allows all children to develop answers, longer and more elaborate answers can be given, and answers will have reasons and justifications because they have been thought about and discussed. For the Inquiry Based Strategy, problem based learning employing the IDEAL problem solving model. IDEAL which is an acronym for: Identify problems, Define the problem, Explore alternate intervention, Apply the selected intervention; and Look back and evaluating. Nickerson in Phillipson and Lam (2011) opined that IDEAL model lead to problem solving and creativity, making learners active through the lesson. Fatade, Mogari and Arigbabu, (2013) investigated the effect of Problem-based learning (PBL) on senior secondary school students' achievements in Mathematics and found that there were statistically significant differences in the mean post-test achievement scores between students exposed to PBL than those who were not. Another study, of Akınoğlu and Tandoğan (2006), determined that the implementation of problem-based active learning model had positively affected students' academic achievement and their attitudes towards the science course. It was also found that the application of problem-based active learning model affects students' conceptual development positively and keeps their misconceptions at the lowest level. The last strategy that falls under contemporary teaching strategy based on this study is the activity based strategy employing the use of Debate. Zare and Othman (2013) found that using classroom debate as a teaching/learning approach brings many advantages to learners, which include promotion of critical thinking skills, mastering the course content and improving the speaking abilities. Debate promotes interactive learning since people from different cultures cooperate to resolve an issue; they are more likely to come up with innovative ways of dealing with the problems thereby illustrating creative thinking skills.

The idea of Creativity and Innovativeness has been utilized regularly in different fields with various implications. According to Treffinger, Young, Selby and Shepardson (2001a) as cited in Kamonjo, Okere and Wachanga (2015), Creativity is the ability to generate ideas digging deeper into ideas, openness, and courage to explore ideas and listening to one's inner voice. Creative individuals are divergent thinkers and Divergent thinking is sometimes used as a synonym for creativity in psychology literature. The measurable characteristics/ dimensions associated with general creativity are; **Fluency:** which is measured by the number of relevant responses to questions and is related to the ability to produce and consider several alternatives. **Flexibility:** is the ability to produce responses from a wide perspective. **Originality:** is the ability to produce ideas that differ from those of others. **Elaboration:** elaboration is the ability to produce detailed ideas (Guilford, 1959 and Society_for_Creative_Minds, 1969). These four dimensions correspond to the same concepts as those of the Torrance tests of creative thinking, TTCT; (Torrance, 1966). Torrance (1966) argues that perhaps the most promising areas if we are interested in what can be done to encourage creative talent to unfold, is that of experimentation with teaching procedures which will stimulate students to think independently, to test their ideas and to communicate them to others. Taking a lead from Pana and Escarlos, (2017) study on Contemporary Teaching Strategies on Students' Attitude, Academic Performance and Acquisition of The 21st Century Skills, this study investigated the impact of Contemporary Teaching Strategies which is a combination of Think-pair-share strategy, IDEAL problem-solving model and Classroom debate on improving creativity and academic performance of secondary school students in organic chemistry concepts.

Statement of the Problem

In spite of the important position of organic chemistry in science and science related disciplines, students' performance has consistently been below expectation and unimpressive. According to Coll (2014) students consider organic chemistry a big hindrance to the study of chemistry as a discipline. Several factors affect students' poor performance, some of these have been known to include students' preparedness learn the concept, poor conceptual foundation, students' disinterest, large class sizes and psychological fear for chemistry. Often, poor performance is blamed on students because of their low retention capabilities, low motivation, low achievement, inappropriate social groups in school, and parental issues. Nevertheless, other factors such as teachers also play a significant role during the teaching and learning process as they influence students' attitudes towards the study of chemistry. Thus, more interactive and engaging environments where enthusiastic teachers facilitate and do not bear too much on students' constructive activities could enable students to feel free, while they take responsibilities for their actions, and learn to construct their own informed knowledge. Chemistry is a discipline that contributes to uplift humankind's living standards through the provision of health and other social amenities. It is one discipline upon which technological advancement is hinged. Thus, chemistry education, and organic chemistry education in particular, must be every country's gateway to technical and industrial growth through scientific creativity (as one of the 21st century skills). Science students in our society today are lacking in the development of manipulation skills which leads to problem solving skills because of the high rate of rote-learning. This might to be due to the teaching methods used by Science educator in the classroom. When learners learn through rote-learning, they lack the ability to become active thinkers, Creativity and problem solving skills are expected to be used by teachers. Scholars who have studied creativity in science context has focus on how to create a conducive learning environment using different teaching method such as cooperative, inquiry-based method, brainstorming strategy, project-based learning and problem-based learning independently; this methods have been helpful over time. Based on this, this study employed the use of a Contemporary teaching strategy to improve students' creativity and academic performance in organic chemistry concepts among senior secondary school students, under the following objectives:

1) Investigate the impact of Contemporary Teaching Strategy (CTS) on Chemistry Students' Creativity skills in Organic Chemistry Concepts.
2) Determine the performance of chemistry students when exposed to Contemporary Teaching Strategy (CTS) in organic chemistry concepts.

To achieve the set objectives, the following research questions are raised;

1) What is the impact of Contemporary Teaching Strategy (CTS) on Chemistry Students creativity score (fluency, expansion, originality and flexibility features) ?
2) Is there any difference between the mean performance score of chemistry students when exposed to Contemporary Teaching Strategy (CTS) compared with those taught with lecture method?

Null Hypotheses

The following null hypotheses were formulated to be tested at 0.05 level of significance.

HO_1: There is no significant difference in the Creativity score (fluency, expansion, originality and flexibility features) of Chemistry Students exposed to Contemporary Teaching Strategy (CTS) before and after treatment.

HO_2: There is no significant difference in the mean performance score of Chemistry Students exposed to Contemporary Teaching Strategy (CTS) and those taught with lecture method.

Methodology

The design of this study was a quasi-experimental design involving pretest, posttest control group. The target population comprised all the Public (co-educational schools) Senior Secondary II Chemistry students (SS II) in Katsina metropolis of Katsina state, Nigeria. As of the time of the study, there are total of 862 students offering chemistry in the zone. In choosing the sample schools, Simple Random Sampling by Balloting was employed to select two schools from the population. The selected schools were grouped into experimental and control group respectively. Experimental group was treated using Contemporary Teaching Strategy CTS while the control group was taught using the Lecture method. A sample size of 120 students was used for the study; 57 for the experimental group and 63 for the control group. The instruments for data collection were the Organic Chemistry Performance Test (OCPT) and Jamal Abedi's Creativity Test (JACT). The OCPT was developed by the researcher based senior secondary school curriculum from paste SSCE questions, containing 30 multiple choice objective tests items with one correct answer and three distractors. The instrument was dully validated and pilot tested with a reliability coefficient of r= 0.68. The JACT was adapted from Nozari and Siamian (2014). Using SPSS software, the raw data were reviewed and analyzed. The intervention lasted for four weeks after which the study subjects were post-tested with the OCPT (in which the items were shuffled to control extraneous factors like memory factor) and JACT. The Pre-test and Post-test data obtained was collated, analyzed and hypotheses was tested using dependent and independent t-test statistic respectively. The Contemporary Teaching Strategy (which involves the integration of several strategies) employed the using of the IDEAL Problem-solving model embeded during the Pairing stage of the Think-Pair-Share. If also used Classroom debate which was introduced into the Sharing Stage of the Think-pair-share which is a Cooperation teaching strategy.

Results

HO_1: There is no significant difference in the Creativity score (fluency, expansion, originality and flexibility features) of Chemistry Students exposed to Contemporary Teaching Strategy (CTS) before and after treatment.

Table 1: T-test Analysis Comparing the Creativity (Fluency, Expansion, Originality and Flexibility Features) before and after Treatment of Experimental group

Component	Before and After treatment	Groups	N	Mean	SD	T	Df	P-value
Fluency	Before treatment	Experimental	57	39.15	7.06	0.602	56	0.001
	After Treatment	Experimental	57	45.81	5.86	21.22	56	
Elaboration	Before treatment	Experimental	57	24.96	3.53	-0.277	56	0.001
	After treatment	Experimental	57	28.18	3.06	13.156	56	
Originality	Before treatment	Experimental	57	28.25	4.86	-0.631	56	0.001
	After treatment	Experimental	57	33.46	4.21	15.40	56	
Flexibility	Before treatment	Experimental	57	18.43	3.07	-1.277	56	0.001
	After treatment	Experimental	57	22.81	2.88	12.79	56	

*Significant at $p \leq 0.05$

From Table 1, result from the creativity Score of the experimental group before and after treatment reveal that for the Fluency, Elaboration, Originality and Flexibility component, there is no significant difference as all components of creativity shows a p-values of 0.001 which is less than 0.05 level of significant. This implies that exposure to Contemporary Teaching Strategy significantly enhanced the creativity skill of the students in the experimental group. Therefore the null hypothesis is not retained (rejected).

HO_2: There is no significant difference in the mean performance score of Chemistry Students exposed to Contemporary Teaching Strategy (CTS) and those taught with lecture method.
The result of t-test analysis is as shown in Table 1;

Table 2: t-test Analysis of Mean Academic Performance Scores of Experimental and Control Groups

Variable	N	Mean	Mdf.	SD	SE	df	t-value	p-value	R
CTS	57	36.15	17.88	7.04	0.33	118	10.29	0.001	S
NCTS	63	18.27		3.61	0.29				

*Significant at P ≤ 0.05

Table 2, is a summary of the inferential statistic and t-test analysis of the Mean academic Performance Scores of Experimental and Control Groups. It is evident that a mean difference of 17.88 exists between the two groups in favor of the experimental group. Also, the calculated p-value of 0.001 is less than 0.05 level of significance. This implies that exposure to Contemporary Teaching Strategy significantly enhanced the academic performance of the students in the experimental group compared to their courter-part in the control group. Therefore, the null hypothesis of no significant difference is rejected.

Discussion

The outcomes from Table 1 and Table 2 demonstrated that the creativity scores before and after exposure to CTS and performance of students exposed to Contemporary teaching strategy in the experimental and control groups show significant difference. The result shows a significant change on the four dimensions of creative thinking skill of the students after exposure to the Contemporary teaching strategy compared to their earlier creativity before exposure to CTS.

Contemporary Teaching Method

Cooperative Teaching Strategy (Think-Pair-Share)

The finding of this study on introducing think-pair share into the CTS is line with that finding of Wandi, Ananda and Nurdin (2018) who investigated the effect of think pair share on creativity and student learning outcome, the finding showed that the strategy enhances creativity and performance. It is also in consistent with Awaid and Abood (2014) findings. The research aims to know the effect of (Think-pair-share) strategy on the students' achievement and the improvement of students' attitude toward chemistry. According to the results, the researchers recommended the adoption of the strategy in the teaching Chemistry for the students of the first year intermediate. And supported by Ifamuyiwa and Onakoya (2013) finding, who though carried out their research in a different state but found that students' performance was enhanced after being taught using the think-pair-share cooperative strategy.

Inquiry based Strategy (IDEAL problem solving model)

On infusing IDEAL problem solving in the CTS, the findings is in line with Nozari and Siamian (2014) study on problem solving teaching method, which has a significant effect on creativity level of students. The study of Uchenna and Sunday (2011) also concluded that problem solving abilities and students' learning styles have significant effects on the student's achievement. Since Chemistry involves a lot of problem solving, these strategies will help students to possess the problem solving skills. However, the results of this study were in contrast with some studies such as Cohen, Kennedy-Justice, Pai, Torres, Toomey, DePierro, & Garafalo (2000) as cited in Adegoke (2017) on the effect of problem-solving instruction on students' achievement in science, the results of their study showed that there was no improvement in the achievement of students. Specifically, the study of Cohen et al. (2000) show that instruction in problem solving techniques, including explanations and examples has little value in helping students become better problem solvers. One of the reasons why the results of this study were not in consonance with that of Cohen et al. was that in this study efforts were made to enhance students' creativity through inculcating a model and other strategies (CTS) into the problem solving strategy.

Activity Based Strategy (Classroom Debate)

On inculcating Classroom Debate into the Sharing stage of the Think-pair-Share in the CTS**,** the findings is supported by, Zare and Othman (2013) finding that using classroom debate as a teaching/learning approach brings many advantages to learners, which include promotion of critical thinking skills, mastering the course content and improving the speaking abilities. It is also supported by Rear (2010) who finding on the effect of classroom debate on undergraduate students oral communication skills reveals that classroom debate not only improve participant public speaking skill but also creativity skills, communication skills, organization skills and note-taking skills as well. But Lee (2005) as cited in Zare and Othman (2013) argued that classroom debate is not significant because students are not given enough time for preparation which he considered very important reasoning being that it is not fair to expect them to debate an issue critically and intelligently when they have not been given adequate chance to prepare. For this study, there was a hand full of timing to comprehend as the debate comes up at the last stage which is the sharing stage of the think-pair-share of the CTS.

The study in general took a lead from, accordance with and supported by from Pana and Escarlos (2017) on Contemporary Teaching Strategies on Students' Attitude, Academic Performance and Acquisition of the 21st Century Skills. The finding of this study established that integration of teaching strategies enhance performance and the 21st Century Skills such as Creativity in learning and mastering of concepts.

Conclusion and Recommendations

Based on the result obtained, finding and discussion, it is concluded that the Contemporary Teaching strategy which is an integration of teaching strategies significantly enhance performance and creativity in students/chemistry students. And hereby recommend the use of this strategy in the teaching and learning process. Other strategies can be integrated together rather than the ones used in this study and by Pana and Escarlos (2017) to enhance self-confidence, motivation, critical thinking skills and other 21^{st} century skills.

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EFFECT OF JIGSAW-IV COOPERATIVE LEARNING STRATEGY ON PERFORMANCE IN AIR POLLUTION AMONG UPPER BASIC SCIENCE STUDENTS IN ZARIA, KADUNA STATE, NIGERIA.

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Abstract
This study examined the effects of Jigsaw-IV Cooperative Learning Strategy (J4CLS) onacademic performance in Air Pollution concept among Upper Basic Science students in Zaria Educational Zone of Kaduna State, Nigeria. The study adopted a Quasi-Experimental, pre-test, post-test control group design. The population comprised all the 1,802 JSS2 Basic Science students from 20 public Junior Secondary Schools in Zaria Educational Zone. The sample was 87 students selected from two coeducational Junior Secondary Schools drawn from the population through a simple random sampling. One school was used as experimental group and the other as control. The experimental group was taught the concept of Air Pollution using the J4CLS while the control group was taught the same concept using lecture method. The research instrument "Air Pollution Performance Test" (APPT) was used for the pre-test and post-test. APPT contains 30 multiple choice items and was well validated. Its reliability coefficient is 0.75 and was determined using Kuder-Richardson K-R20 method. Two research questions and two null hypotheses guided the study. Research questions were analyzed using mean and standard deviation while Independent samples t-test was used to analyze the null hypotheses at P < 0.05 level of significance. The findings showed that students exposed to the J4CLS performed significantly better than their counterparts taught using the lecture method. Also, male and female students do not differ significantly in their academic performance when exposed to J4CLS. Based on these findings, it was recommended among others that Basic Science teachers should employ the J4CLS in the teaching of Basic Science concepts like Pollution in Junior Secondary Schools' classroom to enhance students' performance since the strategy is student centered.

Introduction

Science and technology are the driving forces behind every nation's development in the 21st Century. Science is a systematized body of knowledge about the universe and the process of enquiry for obtaining and building up knowledge of natural phenomenon, first by observations and the utilization of the individual's mental powers or process to mediate on the data in order to generate meanings or new information (Datom, 2015). Science is a systematized knowledge and collection of human activities carried out by the scientist. Basic Science by conception and definition emphasized the content as well as the process of science, the development of mental skill, acquisition of appropriate motor capabilities and the evolution of positive attitude amongst others. The Vienna congress, 1968 of the United Nation Education, Scientific and Cultural

Organization (UNESCO) in Datom (2015) defined Basic Science as approaches in which concepts and principles of science are presented so as to express the fundamental unity of scientific thought and to avoid premature or undue stress on the distinction between the various scientific fields. This definition emphasises that Basic Science is a composite, all-embracing course that lays no emphasis on the traditional boundaries of the various science subjects. It is a course that serves as a good foundation for scientific literacy, personal growth, social relevance, process of enquiry and general education. This definition shows that presentation of the course by teachers for effective comprehension requires specialized skills.

Basic Science has come to be a core subject in the Nigerian Junior Secondary Schools system. The course therefore, has been offered to enhance laboratory activity, provide concrete experience, stimulate interest in school and increase scientific literacy. It also understands the process of science, maintaining flexibility and showing relationship of science to society (Gadzama, 2012). Basic Science serves as a base for further scientific study in higher levels of education and consequently, transformation of the Nigerian society through science and technology. In addition to these it was the opinion of scholars like Haggis and Gagne in Datom (2015) who opined that poor Basic Science teaching and learning could emanate from lack of activity-oriented methods of teaching, inability of teachers to improvise learning materials and the inability also to involve students in Basic Science activities both outside and inside the class. Other problems identified include low morale and poor preparation of teachers, overcrowded classroom/inadequacy of laboratory and workshop facilities, poor attitude of students to work, gross under-funding and inadequacy of rewards for excellence in science teaching and learning among others (Obomanu & Nbina, 2010). In addition, pieces of research evidence show that Basic Science teachers are poorly trained in both content knowledge, assessment techniques and pedagogy (Ibe, 2008). Various studies such as those of Akbani and Allvar (2010), Jekayinfa (2007) and Usman (2007 & 2010) have shown that teachers of Basic Science are not qualified and this in turn affects academic performance. One major problem of the teachers is that of inability to use appropriate activity–based teaching strategy. They often resort to the usual traditional lecture method that has been shown to lead to poor academic performance in junior secondary schools in Basic Science.

Conventional teaching or the traditional teaching methods are the ordinary teaching methods used by teachers to deliver the contents of the syllabus to the learners (Macharia, Githua & Mboroki, 2009). Most conventional methods of teaching Basic Science are teacher-centred. The teacher demonstrates and summarizes the main points and there is surface learning of concepts, principles and skills (Mbacho, 2013). These methods are highly dependent on the skills of the teacher and not useful in enhancing learners interpersonal and communication skills. (Macharia, Githua & Mboroki, 2009). Teachers need to help students develop the skills they will use every day to acquire scientific knowledge and skills which include the ability to reason, explain and justify ideas. The teacher should also help students to use resources to find needed information to work with other people on a problem and to generalise to different situations as well as the ability to apply scientific knowledge and skills.

Jigsaw Learning Strategy

Cooperative learning is a successful teaching strategy in which small teams, each with students of different levels of ability, use a variety of learning activities to improve their understanding of a subject (David & Roger, 2001). Each member of a team is responsible not only for learning what is taught but also for helping teammates learn, thus creating an atmosphere of achievement. Students work through the assigned task until all group members successfully understand and complete it. Over the past decade, cooperative learning has emerged as a leading approach classroom instruction. Students completing cooperative learning group tasks tend to have higher academic test scores, higher self esteem, greater numbers of positive social skills, fewer stereotypes of individuals of other races or ethnic groups, and greater comprehension of the content and skills they are studying (Mbacho, 2013). Students work in small groups thereby cooperating to ensure their own learning and the learning of all others in their group (Mbacho & Changeiywo, 2013). This emphasis on academic learning success for each individual and all members of the group is one feature that separates cooperative learning groups from other group tasks (Mbacho, 2013).

According to Mbacho and Changeiywo (2013), to be successful in setting up and having students complete group tasks within a cooperative learning framework, a number of essential elements or requirements must be met which includes: a clear set of specific student learning outcome objectives, clear and complete set of task-completion directions or instructions, heterogeneous groups, equal opportunity for success, positive interdependence, face-to-face interaction, positive social interaction behaviours and attitudes, access to must-learn information, opportunities to complete required information-processing tasks, sufficient time is spent learning, individual accountability, public recognition and rewards for group academic success, post-group reflection (or debriefing) on within-group behaviours (Timayi, Bolaji & Kajuru, 2015).

According to Aronson (2000), Jigsaw is a cooperative learning strategy that enables each student of a "home" group to specialize in one aspect of a learning unit. Students meet with members from other groups who are assigned the same aspect and after mastering the material, return to the home group and teach this material to the group members. Jigsaw can be used whenever material can be segmented into separate components. Each group member becomes an expert on a different concept or procedure and teaches it to the group (Maden, 2010). Just like a Jigsaw puzzle, each piece (student part) is essential for the completion and full understanding of the final product. Therefore, each student is essential for the understanding of the whole concept being taught. According to Aronson (2000), the advantage of Jigsaw learning strategy is that students perform the challenging and engaging tasks in their experts groups with enthusiasm since they know they are the only ones with that piece of information when they move to their respective groups. Students who tutor each other must develop a clear idea of the concept they are presenting and orally communicate it to their partner (Timayi, Bolaji & Kajuru, 2015).

As a teaching tool, that is a part of cooperative learning approach, Jigsaw was first used by Eliot Aronson in 1978 to improve the collaboration of students that includes two different actions of small groups (Hedeen, 2003). As for application phase of Jigsaw technique the following are highlighted:

i. Forming groups (consisting of 4 or 7 students) preferably heterogeneous ones.
ii. Dividing the materials (the subject is divided into smaller parts in accordance with the number of students. Each part is given to one student.
iii. Creating expert groups (valid for Jigsaw technique).

According to Maden (2010), students leaving their own groups form new groups with other students who are responsible for preparing the same subject. These groups called "expert" attempt to clarify the subject, make plan about how to teach the subject to their classmates and then turn back to their own group teach their subject as they have done in the expert group. At the last phase, teacher makes an either individual or small group activity in order to complete their learning. For example, teacher can make one of the actual group's students present one of the subject materials. Through some studies into Jigsaw technique, the implementation phase has been somewhat changed and diverse types of this technique has occurred. Apart from Jigsaw I, Jigsaw-II (Slavin, 1987), Jigsaw-III (Stahl, 1984), Jigsaw-IV (Holliday, 2000), Reverse Jigsaw (Heeden, 2003) and Subject Jigsaw (Doymus, 2007) have been developed.

The jigsaw technique can enhance cooperative learning by making each student responsible for teaching some of the materials to the group (Timayi, Bolaji & Kajuru, 2015). In this technique, students are members of two different groups, the "home group" and the "jigsaw group" or "expert group." Initially, students meet in their home groups, and each member of the home group is assigned a portion of the material to learn as an "expert" (Doymus et al., 2004). One of the modern and useful teaching tools that can meet the requirement of students' self-esteem, intrinsic motivation, students cooperatively learning together, developing individual strategies for constructing meaning, and above all of focusing on the communicative process within group working in the axis of cooperation is Jigsaw IV. This technique appears to be more developed for complete learning compared to other Jigsaw techniques (I-II-III). Unlike the other techniques, in this technique whether the expert members are specialized is tested. According to test results, the missing parts of the learning are determined and completed. The same implementation is repeated to the actual group members after the expert members carry out their subject presentation in the actual groups.

Retention in this study is the ability to remember tasks, or material learnt concepts. Bichi (2002) defined retention as the ability to retain and recall information or knowledge gained after learning. Researchers like Obeka (2010) investigated and defined several variables that affect retention including the content or tasks to be performed, learners past experiences, the interval between lesson and evaluation and instructional strategies employed. Some studies such as those of Chianson, Kurumeh & Obida (2011) and Tran (2014) have examined the retention ability of students when exposed to the cooperative learning strategy in comparison to the traditional or conventional lecture method. However, Chianson et al (2011) revealed from their findings that cooperative learning was found to be more effective in the learning of Circle Geometry in terms of retention than the lecture method. Similarly, Tran (2014) affirmed that that experimental subject who had engaged in learning together produced a higher overall improvement on their retention scores compared to the control group subjects which received instruction using the lecture method. These findings also validates the findings of previous studies such as Slavin (2011), Sahin (2010) and Johnson & Johnson (2008). In addition, gender is also another area of concern to researchers and educators. This is evident from the report of Okebukola (2002), Longe and Adedeji (2003), Yoloye (2004), and Ezirim (2006) and a host of others. They noted that gender has impacted on science education. Male supremacy and gender stereotyping are factors among others that were identified to influence occupational choice. Hence, Longe and Adedeji (2003) are of the opinion that science and technology is a male-dominated subject and that females tend to shy away from scientific and technological fields. Therefore, boys appear to have a natural positive attitude to technical and science subjects. However, girls showed negative attitude. This negative attitude of girls appears to be due to the acceptance of the myth that boys are better in science subjects than girls. Babajide (2010) further admitted that science subjects such as physics and chemistry are given masculine outlook by education practitioners.

Objectives of the Study

The objectives of this study are to:

i. determine the effect of Jigsaw-IV Cooperative Learning Strategy (J4CLS) on the academic performance of JSS2 Basic Science students in Air Pollution concepts;
ii. examine the effect of Jigsaw-IV Cooperative Learning Strategy (J4CLS) on the academic performance of male and female JSS2 Basic Science students in Air Pollution concepts;
iii. determine the effect of Jigsaw-IV Cooperative Learning Strategy (J4CLS) on the retention ability of JSS2 Basic Science students in Air Pollution concepts;
iv. examine the effect of Jigsaw-IV Cooperative Learning Strategy (J4CLS) on the retention ability of male and female JSS2 Basic Science students in Air Pollution concepts.

Research Questions

The study sought to provide answers to the following questions:

i. What is the difference in the mean academic performance scores of JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS) and those taught the same concept using Conventional Lecture Method?
ii. What is the difference in the mean academic performance scores of male and female JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS)?
iii. What is the difference in the mean retention scores of JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS) and those taught the same concept using Conventional Lecture Method?
iv. What is the difference in the mean retention scores of male and female JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS)?

Null Hypotheses

Based on the objectives and research questions stated above, the following null hypotheses are formulated for testing at $P \leq 0.05$ level of significance:

Ho_1: There is no significant difference in the mean academic performance scores of JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS) and those taught the same concept using Conventional Lecture Method.

Ho_2: There is no significant difference in the mean academic performance scores of male and female JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS).

Ho_3: There is no significant difference in the mean retention scores of JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS) and those taught the same concept using Conventional Lecture Method.

Ho_4: There is no significant difference in the mean retention scores of male and female JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS).

Scope of the Study

All public Junior Secondary Schools within Zaria Educational Zone of Kaduna State, Nigeria were included in the study population but the study only made use of two public co-educational schools. JSS 2 students were also used for the study. The JSS II students were suitable for the study, because the newly admitted JSS I students were yet to settle for serious academic work and some of them reported late. Also, JSS III students were busy preparing for the Junior Secondary Certificate Examination (JSCE). The concept chosen for the study is Air Pollution and the sub-topics covered include: Meaning of Air Pollution; Causes of Air Pollution; Effects of Air Pollution; and Possible Solutions to Air Pollution Problems.

1.7 Basic Assumptions

The study has the following basic assumptions:

1. The schools selected and used for the study are true representatives of all Junior Secondary Schools in Zaria Educational Zone.
2. The students already have a year's experience of Basic Science at their JSS1 level.
3. The Basic Science teachers in the various schools under this study are qualified.
4. The learning environment in the schools are conducive for the successful implementation of Jigsaw IV Cooperative Learning Strategy.
5. The schools in the study area all use the same Basic Science Curriculum.

Research Design

The research design adopted for this study is the quasi-experimental design, employing the pre-test, post-test, control group design as suggested by Kerlinger (1973). The design comprised two-groups, one experimental (EG) and the other control (CG) with each group consisting of both male and female students. A pre test was administered to the groups before the treatment to determine the group comparability of experimental and control groups' ability level. Experimental Group was taught Air Pollution concept using Jigsaw-IV Cooperative Learning Strategy (J4CLS) while the control group was also taught the same concept using the Conventional Lecture Method. At the end of the treatment period, a posttest was administered to all the three groups of students in order to determine the effectiveness of the treatment. The treatment was done within five weeks.

EG → O_1 → X_1 → O_2
CG → O_1 → X_0 → O_2

Fig. 1: The Research Design

Key:

EG = Experimental group
CG = Control Group
O_1 = Pretest on Academic Performance
O_2 = Post-test on Academic Performance
X_1= Treatment (Guided-Discovery Method)
X_0 = Lecture Method

Population of the Study

The population of the study comprised of all Junior Secondary Schools year two (JSSII) students of the public schools in Zaria Educational Zone of Kaduna State, Nigeria. This was made up of twenty (20) schools with a total enrolment of 1,802 (869 male and 933 female) students. The zone has fifteen (15) co-educational schools, two (2) single boys' schools and three (3) single girls' schools.

Table 1: Population of the Study.

S/N	Name of Schools	Type	Number of Students		
			Male	Female	Total
1.	Alhudahuda College	Male.	103	-	103
2.	Barewa College	Male.	122	-	122
3.	G.S.S. T/Jukun	Co-Educ.	050	035	085
4.	G.S.S. Kofan-Kuyanbana	Co-Educ.	045	045	090

5.	G.S.S. Dakace	Co-Educ.	035	032	067
6.	G.S.S. Kugu	Co-Educ.	047	029	076
7.	S.S.S. Kufena	Co-Educ.	050	048	098
8.	G.C.C. Zaria	Co-Educ.	043	032	075
9.	G.G.S.S. Zaria	Female	-	159	159
10.	G.G.S.S. KofanGayan	Female	-	092	092
11.	G.J.S.S. Tudun Wada	Co-Educ.	041	034	075
12.	G.J.S.S. Gyallesu	Co-Educ.	033	038	071
13.	G.J.S.S. Bogari	Co-Educ.	045	052	097
14.	G.J.S.S. R/Doko	Co-Educ.	046	036	082
15.	G.J.S.S. K/Jatau	Co-Educ.	046	040	086
16.	G.J.S.S. K/Doka	Co-Educ.	035	029	064
17.	G.J.S.S. Richifa	Co-Educ.	047	033	080
18.	G.J.S.S. Zaria	Co-Educ.	045	048	093
19.	G.J.S.S. Magajiya	Co-Educ.	036	031	067
20.	G.G.J.S.S. Pada	Female	-	120	120
	TOTAL		**869**	**933**	**1802**

Source: Ministry of Education, Zonal Educational Office, Zaria, Kaduna State (2016).

Sample and Sampling Techniques

Four (4) co-educational schools were initially selected by the simple random sampling out of the fifteen (15) co-educational schools in Zaria Educational Zone namely: GJSS Zaria, SSS Kufena, GSS Kofan-Kuyanbana and GJSS Bogari. These schools were pretested on a multiple choice Air Pollution Performance Test (PPT) which was an instrument developed by the researcher for the study. The result obtained was subjected to the analysis of variance (ANOVA) and the Scheffe's test to determine the student's ability. Consequently, two schools were then selected by simple random sampling from the three schools found to have equivalent ability. They are GSS Kofan-Kuyanbana (taken as the experimental school) and GJSS Zaria (as the control school). One intact class from the JSS2 arm was selected by simple random sampling method from each of these schools for the study. This was because the school administration did not allow disorganization of classes for the purpose of the study. The sample for the study comprised 87 students (i.e. 45 students for the experimental group and 42 students for the control group).

Table 2: Sample of the Study.

S/N	School	Group	Male	Female	Total
1	School A	Experimental	25	20	45
2	School B	Control	22	20	42
	Total		**47**	**40**	**87**

Instrumentation

The instrument developed by the researcher to collect data for the study was Air Pollution Performance Test (APPT) which contains 30 multiple choice items. The instrument covered four (4) sub-topics of the Air Pollution concept including: Meaning of Air Pollution; Causes of Air Pollution; Effects of Air Pollution; Possible Solutions to Air Pollution. The table of specification of APPT is presented in Table 3:

Table 3: Test Blueprint for APPT Construction.

S/N	Concepts	Weight (%)	Knowl (40.0%)	Compr (33.3%)	Applic (26.7%)	Total (100%)
1.	Meaning of Air Pollution	23.3	3	2	2	7
2.	Causes of Air Pollution	26.7	3	3	2	8
3.	Effects of Air Pollution	26.7	3	3	2	8
4.	Solutions to Air Pollution Problems	23.3	3	2	2	7
TOTAL		**100**	**12**	**10**	**8**	**30**

Source: Researcher (2018).

For content validation and reduction of errors, the instrument APPT was subjected to face and content validation by three experts, two from Science Education Department and one from Biological Sciences Department, all from Ahmadu Bello University, Zaria. All the experts have minimum rank of senior lecturers and minimum of PhD qualification.

Government Junior Secondary School (GJSS), Kofar-Doka JSS II students were used for pilot testing of the instruments. One intact class of sixty-four (64) students made up of 35 boys and 29 girls formed the participants for the pilot study. These JSSII students are part of the population, but not part of those identified to be used for the main study. The study participants were all students in the class since Basic Science is a compulsory subject to every child. The aim of this pilot study was to determine the characteristics of the test items which include their clarity and reliability coefficient.

With the trial test, the researcher was able to determine the appropriate timing (duration) for each test as well as identify any problem which may affect the effective administration of the instruments during the actual experiment. Air Pollution Performance Test (APPT) took forty-five minutes. This was the average time it took the first and the last participant to finish the paper (test) during the pilot testing. The data obtained from the trial testing were used to estimate the reliability (internal consistency) of the instrument.

The instrument was administered to the participants after an intensive teaching session which lasted for one week. The result obtained from administration of APPT was used to calculate the reliability coefficient of the instrument. The instrument was found to have a reliability coefficient of r=0.75 using Kuder-Richardson K-R20 method. Since the test was a multiple choice objective item test that was scored dichotomously, the formula was suitable in determining the internal consistency of APPT.

The pilot study also helped the researcher to assess the clarity of the instrument as well as determine the appropriate number of weeks that was suitable for conducting the actual field work. It also helped to pre-empt the difficulties the researcher was coming to encounter in the application of Jigsaw-IV Cooperative Learning Strategy in the teaching and learning of Air Pollution concept of Basic Science.

The results of pilot testing were also used to determine the item analysis of APPT. The analysis was based on item difficulty, and discrimination indices. Item difficulty is a measure of percentage of candidates who got the item right divided by the total number of candidates that attempted the item. The discrimination index of the test is the ability of the test item to separate between high and low-ranking students in the entire test (National Teachers Institute (NTI), 2009). Researchers such as Tuckman (1975), Fraenkel & Wallen (2000) and Sambo (2008) suggested that items with difficulty index between 40% to 60% are accepted as good item. Items below 40% are considered being too easy, and 60% being too difficult. For the purpose of this study, items with difficulty index of 25% to 75% are retained while others are modified to suit the research. Sambo (2008) suggested that items of discrimination index of 0.30 - 0.90 are very good for a study, 0.30 – 0.39 are moderate, 0.20 – 0.29 are marginal items that need improvement, while items with discrimination index of 0.1 - 0.19 are poor items to be discarded. Thus, in this study item between 0.30-0.70 were accepted and selected for the APPT instrument based on recommendations made by Tuckman (1975), Fraenkel & Wallen (2000) and Sambo (2008).

Results

The results obtained in the study are presented as follows:

Research Question One: What is the difference in the mean academic performance scores of JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS) and those taught the same concept using Conventional Lecture Method?

Table 4: Mean and Standard Deviation of Post test Scores of the Experimental and Control Groups.

Group	N	Post test Mean	SD	Mean Difference
Experimental	45	21.78	4.08	4.11
Control	40	17.67	2.99	

Table 4 shows that the mean academic performance score of the experimental group is 21.78 while that of the control group is 17.67. The standard deviation for the experimental and control groups are 4.08 and 2.99 respectively. The mean difference is 4.11. This means that the experimental group achieved higher than the control group and this can be attributed to the exposure of the experimental group to the Jigsaw-IV Cooperative Learning Strategy.

HO_1: There is no significant difference in the mean academic performance scores of JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS) and those taught the same concept using Conventional Lecture Method.

Table 5: Summary independent t-test Analysis of Academic Performance Scores of Experimental and Control Groups

Group	N	Mean	SD	Mean Difference	Df	t-value	p-value	Remark
Experimental	45	21.78	4.08	4.11	85	5.33	0.001	Significant
Control	42	17.67	2.99					

Significant at $P \leq 0.05$

From Table 6, the P-value of 0.001 which was obtained is less than P-value of 0.05 level of significance. P = 0.001 is significant hence, the null hypothesis one which states that there is no significant difference in the mean academic performance scores of JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS) and those taught the same concept using Conventional Lecture Method was rejected. This meant that there is a statistically significant difference between the mean academic performance scores of the experimental and control group. The result therefore showed that the J4CLS is more effective than the lecture method in improving students' academic performance in Air Pollution concept. This was connected to the nature of the J4CLS, which is a student-centered teaching approach.

Research Question Two: What is the difference in the mean academic performance scores of male and female JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS)?

Table 6: Mean and Standard Deviation of Post-test Scores of Male and Female Students in the Experimental Group.

Group	N	Post test Mean	SD	Mean Difference
Male	25	21.36	4.14	0.94
Female	20	22.30	4.05	

Table 6 shows that the mean academic performance score of the male students in the experimental group is 21.36 while that of the female students is 22.30. The standard deviations for the male and female students in the experimental group are 4.14 and 4.05 respectively. The mean difference is 0.94. This means that the female students in the experimental group achieved slightly higher than their male counterparts. To know whether the difference is significant, the null hypothesis two was tested.

HO_2: There is no significant difference in the mean academic performance scores of male and female JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS).

Table 7: Summary independent t-test Analysis of Academic Performance Scores of Male and Female Students in the Experimental Group

Group	N	Mean	SD	Mean Difference	Df	t-cal	p-value	Remark
Experimental	25	21.36	4.14	0.94	43	0.76	0.449	Not Significant
Control	20	22.30	4.05					

Significant at $P \leq 0.05$

From Table 7, the calculated P-value of 0.449 is greater than P-value of 0.05 level of significance. P = 0.449 is significant hence, the null hypothesis two was retained. This implies that there is no statistically significant difference in the mean academic performance scores of male and female JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS). The result therefore showed that the Jigsaw IV Cooperative Learning Strategy is a gender friendly teaching methodology.

Summary of the Findings

The findings of this study are summarized as follows:

i. There is a statistically significant difference in the mean academic performance scores of JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS) and those taught the same concept using Conventional Lecture Method.
ii. There is no statistically significant difference in the mean academic performance scores of male and female JSS2 Basic Science students taught Air Pollution concepts using Jigsaw-IV Cooperative Learning Strategy (J4CLS).

Discussion of the Findings

The result in Table 4 showed that there is a difference in the mean and standard deviation scores of the experimental and control groups in favour of the latter. This difference was subjected a t-test in Table 5. The Table revealed that the difference observed was significant. The students exposed to the J4CLS had a higher mean gain compared to those taught by the lecture method. This implied that the use of J4CLS improved students' academic performance in Air Pollution Concept in Basic Science. This finding is in line with that of Jansoon, Somsook and Coll (2008), Fini, Zainalipour and Jamri (2012), Mbacho and Changeiybo (2013), Mari and Gumel (2015), who found out that the J4CLS was effective in enhancing students' performance in school based subjects like Basic Science and Mathematics. They found a significant difference in performance in favour of the experimental group. This is evidenced in the higher mean scores obtained by students in the experimental groups of their respective studies when compared to other methods of learning. Also, Kolawole (2008), Chianson, Kurumah and Obidah (2011) and Mbacho (2013) in their separate studies found that the cooperative learning strategy is effective in the teaching and learning of geometry and mathematics; they recommended the use of cooperative learning strategy in the teaching and learning of mathematics in Nigerian schools.

The result obtained from Table 6 revealed a higher post-test mean performance score of female students in the experimental group compared to their male counterparts. Consequently, this difference was subjected to t-test analysis as shown in Table 7. The table revealed the observed difference was not significant. This finding is in agreement with that of Mbachu and Githua (2013), and Timayi, Bolaji and Kajuru (2015) who reported that there was no significant gender difference in achievement when students were exposed to the Jigsaw CLS. Further, this study confirms the findings of Linderberg, Hyde, Petersen and Linn (2010) who found no significance difference between performance of male and female students in mathematics.

Conclusion

The J4CLS was more effective at improving the academic performance of students in Air pollution concepts than the lecture method. The J4CLS has significant effect on the academic performance of students. This is evident in the higher mean performance scores obtained by students who were exposed to it. It was also observed that it is gender unbiased since male and female students perform equally well.

Recommendations

Based on the findings of the study, the following recommendations are made:

i. Teachers should employ the J4CLS in the teaching of Basic Science concepts like Pollution in Junior Secondary Schools' classroom to enhance students' performance since the strategy is student centered. The strategy also facilitates the learning of much material in limited time which can help the teacher and students cover large portions of the school syllabus.

ii. Students should be encouraged by their teachers to participate in the J4CLS because it is a result oriented strategy that has the potential of improving their interest and performance in Basic Science. It also opens them up to the skill of leadership, tolerance and collaborative efforts that will be needed for success in their careers and life.

iii. Workshops and seminars for science based teachers should be organized by the Ministry of Education for each education zone in Kaduna State on the use of the J4CLS in classroom.

iv. Curriculum planners should officially make J4CLS a valid method for teaching and learning of Basic Science Concepts like Air Pollution in Junior Secondary Schools. This will go a long way in building team spirit in students.

v. Textbook writers should inculcate the J4CLS as a method for teaching Basic Science. This will popularize and make J4CLS acceptable among teachers.

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ADOPTING INNOVATIVE STRATEGIES TO IMPROVE THE QUALITY OFTEACHING AND LEARNING OF BASIC SCIENCE AND TECHNOLOGY IN JUNIOR SECONDARY SCHOOLS IN KANO STATE.

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Introduction

Basic Science and Technology are the foundation of technological and economic development of most countries in the world. In Nigerian junior secondary schools, it is a subject that introduces students to the basic aspect of technology. At the early 80s during the 6-3-3-6 system of education, it was refers to as introductory technology and presently Basic Science under the new system of education the 9- 3- 4 system of education. The nation policy on education defined it as that aspect of education that aims at providing opportunity to students to acquire practical and applied skills as well as basic scientific knowledge that will make them become useful to themselves and the society generally. It is also a subject that deals with fundamentals of engineering and technology and its vital component include; woodwork, metal work, building constructions, electrical/electronics, computer, mechanics, technical drawing. Basic science and technology curriculum therefore, stressed emphasis on teaching and learning of scientific concepts among students at the early stage of secondary education as declared by the federal ministry of education 1981.

Since both basic science and technology are activity based subjects, teachers, who are the direct source of information, need to be loaded with updated information related to content and other resources that is 'use of Technology'. Literature and research suggest that technology is endowed with a potential to innovate education (Blandow and Dyrenfurth, 1994). However, teachers need to bring change in the interaction patterns of the classrooms using technology as a useful innovative technique to teach students and which can only be done when the teachers are trained in using the technology. Teachers proficiency in using technology is another issue which Shaffer (2006), argues that if a teacher cannot read, it would be difficult for him to identify whether the text material in that book is bad or worth reading. When it comes to technology, similar behaviour is noted for innovative teaching to take place, if teachers are not aware of the available resources, and then there will not be any innovative teaching.

Innovative teaching involves using innovative methods, teaching and learning materials for the benefits of students (Mandula, Meda and Jain 2012). According to Anderson and Neri (2012), innovative teaching can involve virtual labs, learning activities based on real-life problems, learning environment with equipment, furnishing materials and audio-visual resources and learning guides for students and the teachers. All of these are combined with methodologies that promote the use of active teaching techniques that help teachers to develop their students' learning abilities.

In more specific and practical term, Basic Science and Technology is the pivot around which growth and development of every nation rest. Furthermore, integration of basic science and technology as pre-vocation training subjects in junior secondary school curriculum in Nigeria and anywhere in the world is aimed at training students for initiating, facilitating, implementing technical development as well as creating awareness of technological literacy (Uwaifo, 2009). For this and many other reasons, the Nigerian school curriculum and visa-vi the basic science curriculum should be activity oriented, student cantered, emphasizing the teaching of basic science and technology as a process rather than learning it just as a body of knowledge (Nwosu 2006).

To achieve excellent result, and brings about reform in the teaching and learning process of basic science and technology, teachers are expected to drill students more on scientific inquiry skills and should therefore make a paradigm shift from traditional methods to a more innovative and activity oriented methods.

As Nigeria is yearning for development in both technology and economy, there is therefore the need for basic science and technology teachers in junior secondary schools in Kano to adopt innovative strategies in attempt to impart positively the required scientific literacy necessary to develop young adults and make the country scientifically great. Therefore, a solid foundation in basic science and technology should be assumed to make meaningful contribution either directly or indirectly towards meeting the Nigerian's need and aspiration for scientific and technological advancement whereas poor foundation will lead to negative outcomes.

Aba (2003), believed that looking at the way the world is rapidly advancing today, as well as the changes events underwent, through the electronic ages with the almighty computer at the centre, there is the need to adopt to the challenges presented by technology by making attempt to update our teaching methodologies in order to be able to conquer more effectively the challenging nature of our basic science and technology classrooms.

Nowadays, our classrooms are exemplified by large number of students leading to congestion, overcrowding and chaos. This makes it difficult for students to comprehend or pay the required attention to the lesson and temper with the effort made by the teacher who is struggling to introduce a new concept. The hindrance in the effort of the teachers may sometimes result from the fact that the classes contain students of diverse culture, religion, family background and socio-economic status. Another new challenge may be concerning the attempt to identify the best teaching strategies that can be used to address such a large number of students' and their demands.

In order to fully and effectively respond to this problem, the teacher should employ different innovative teaching strategies that may appeal to students to use their creative skills and abilities in dealing with problems especially those of practical nature.

Therefore, teachers' skills and competence in handling and using the latest technological devices will be the best way to bring the benefits of innovation in to the classrooms.

The need to adopt innovative teaching strategies in basic science and technology classes

According to Havelock and (1978), and Nicholls (1983), innovation is the deliberate effort perceived as new and intended to bring about improvement. As such, it is distinguished from change which is any difference that occurs between time one and time two. What is particularly importance about innovation is that it is change involving human intervention. And because of urgent need for scientific and technological literacy among our junior secondary school students, there is the need to bring in to limelight areas in teaching basic science and technology that require teachers intervention through the use of innovative strategies aimed at improving the quality of teaching the subjects.

Some of advantages of adopting innovative strategies in the teaching and learning of basic science and technology are that it brings about general improvement in the quality of teaching and learning, it also foster greater understanding of the scientific concepts among students, reduces too much verbal talks on the side of the teachers as well as concretised the lesson.

However, for all these benefits to be derived, prior knowledge of innovative strategies and how they can be implemented to bring a positive improvement in the quality of teaching and learning processes as well as to change the pedagogical approaches we used in our teaching and learning process all are of paramount importance on the side of basic science and technology teachers.

The areas needing attention from the teachers are:

Pedagogical strategies:
Since innovative strategies refers to the application of technological devices in teaching aimed at adopting changes in the style of handling classroom and improving the quality of teaching and learning, there is therefore the need for basic science and technology teachers to make best use of the devices and the advantages brought by the technological tools to simplify the teaching and learn of basic science and technology in our junior secondary schools in Kano state.

For these reasons, science teachers and basic science and technology teachers in particular, ought to be familiar with modern innovative teaching and learning strategies and employ them in the classrooms to improve students understanding of concept and scientific phenomenon. The strategies teachers ought to adopt include computer simulation, videos and games, e-mailing, e-tutoring in addition to the most common ones like guided discovery, problem solving, concept mapping and cooperative teaching and learning strategies.

Resources for teaching basic science and technology
The teaching of basic science and technology as a subject, require variety of resources and facilities ranging from well-equipped labs to equipment and other relevant tools. Akinrotohun (2001) observed that students learn science in a better way when they are exposed to practical particularly when the right equipment are used. The practical activities enable students to develop their cognitive, affective and psychomotor skills make for these knowledge and skills gained to be transform in to values to both the students and the society in general.

The school laboratories must therefore be well equipped to reflect the enabling environment students need to interact with. Also, Akinrotohun (2001), observed that the teaching of basic science and technology in our junior secondary schools suffer a serious setback due to unavailability of facilities. It’s equally be observed that both the public and private secondary schools open in the state daily and with increased number of students population thereby increasing the need for laboratory facilities which the school owners hardly provide them adequately for effective teaching and learning of the subjects to take place.

Many basic science and technology teachers shrived behind lack of science equipment not to conduct or demonstrate practical lessons. But since our natural environment is abundant with variety of resources and the laboratories also contain some basic equipment adaptable to many purposes, the success of teaching basic science and technology will therefore depend upon the teachers’ personal efforts, commitment to work, expertise in using the available resources and being resourceful. In this regard, government must be ready to partner with other stakeholders in order to resuscitate the condition of our school laboratories and lift them up to internationally acceptable standard.

With introduction of basic science and technology in our junior secondary schools, a new horizon was brought in to teaching and learning process, it also introduces a lot of innovation and revolution in to teaching and learning. The 3RS which give rise to the old system of education, has witnessed series of literacy reforms as the world progress to the era of information technology (the computer age) which make it necessary for the basic science and technology teachers to embrace and keep abreast, so as to improve the teaching and learning process using the available and interesting tools it provide.

While internet is the major source of information for basic science and technology teachers, there are other useful and specific website-based applications that can be used as learning resources and the commonest among them is the learning management system (LMS) which is a software application for administration, documentation, tracking, reporting and delivery of electronic educational technology. There are also available open-source, free LMS such as Moodle, coursework, tutor and Interact. Moodle (Object-Oriented-Dynamic- Learning- Package), is the popular among all in which learning developers can create, store, manage and deliver digital learning content from a central object repository through the use of computer(Uwaifo 2009). (Ayşe 2008), Shows that it is unwise to ignore the pedagogical impact provided by Moodle.

Computer simulation:
This is a kind of computer program that attempt to simulate an abstract model of a particular system. It plays a vital role in mathematical modelling of many natural systems in chemistry, physics and biology. Teachers can make use of computer simulation to demonstrate accurately such scientific concepts and phenomenon as temperature, pressure, humidity, wind velocity and soon. For example, the teacher can use simulation to demonstrate to students what happen to the global climate when x amount of carbon is added to the atmosphere.

Teaching with video games:
The idea of teaching students with video games could be very exciting especially if the teacher know how to integrate them well in his teaching and learning process. Games help students to develop a disposition towards collaboration, problem solving, experimentation and exploration of a phenomenon and also increase students' knowledge and retention ability.

E-mail and internet:
Electronic mail (e-mail) can be an important educational tool that can be used to enhance learning in any curriculum. Using this device, the teacher can successful introduce students towards the idea of learning relevant scientific concepts, exchanging and retrieving vital information and so on.

Satellite channels:
Some satellite channels are informative and can significantly help the teacher in passing important messages to students. For example, discovery and national geographic channels can be used to teach students about ecological concepts such as drought, landslide and its effects, earthquake as well as about wild animals, their habits, habitat and reproductive behaviours.

Teachers' orientation for quality teaching of basic science and technology
The quality of teachers who are actual implementers of the basic science and technology curriculum, remain a pointer to the success or failure of basic science students in receiving the

desired vocational, scientific and technical training to make Nigeria proud. In view of this fact, Bello (2004), believed that science teachers has an important role to play in building a strong science education since the quality of science education solely depend upon quality of science teachers.

Akyaa (2010), Observed that science teachers in Nigeria are basically poorly trained in either content or methodologies and as such lack enough knowledge of the exact content and methodology for them to effectively teach the subjects. He further stated that the case of basic science is peculiar because most basic science teachers either have chemistry, physics, mathematics, biology or geography and in some cases agriculture. To be able to teach these subjects effectively and as the teaching of these subjects involve handling and manipulation of scientific equipment, there is the need for teachers to engage themselves in professional programmes capable of improving their academic competence that would make them teachers per excellence.

To be able to meet up with these challenges, teachers should be allowed to attend training and retraining programmes such as conferences, workshops and seminars as that will improve their competency and bring about positive improvement in the teaching and learning process of basic science and technology.

Specifically, using innovative teaching strategies help to improve the quality of students learning ability especially when:

- Right technology is used in classroom, it helps students learn faster as it was observed that in a medical school class with Ipad, students' scores 23% higher than those without the device.
- It makes learning interesting and engaging especially for younger generations rose on the latest technology.
- It allows for faster and more efficient delivery of lesson both in classroom and at home.
- It reduces the need for textbooks and other printed materials, lowering long-term cost incurred by schools and students.
- It makes collaboration easier as students, teachers and parents can communicate effectively.
- It helps to build technology-based skills, allowing students to learn, early on, to embrace and take advantage of the tools technology offers.

Summary, conclusion, and recommendation

Summary:

Today, our schools are overcrowded with students making it difficult for teachers to effectively handle without the proper skills like innovation. This make it necessary for them and the school curriculum planners to make a paradigm shift from the traditional curriculum to more modified version of a curriculum that open way for innovation. Thus, the role of innovation in curriculum development and teaching shouldn't be overemphasized especially at junior secondary school level where the need for students to learn innovative skills is at peak. Innovative skills have the potential to bring a positive change in the learning process of the students.

Conclusion:

One way of achieving the goal of curriculum in school system is through the use of innovation and strategies in teaching. Thus teachers who acquire the right innovative skills are more competent and most equal to their tasks than those who do not. They also skilfully handle their jobs and impart knowledge successfully and positively to their students.

Recommendation:

From the information found above, the following recommendations are made:

- Curriculum planners should realised the importance of innovation and as such try to introduce innovative skills in content of the curriculum so as to enhance the quality of teaching and learning, at the same time enable learners to be more proactive and productive.
- Teachers should embrace the use of innovative teaching and learning strategies as an integral aspect of their job since it general appeal to students' engagement in the lesson as well as promote concept understanding.
- Additional training is necessary for the teachers as it will help them to update their knowledge and skills in handling their classes more effectively through the ability to use modern technological devices.

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CURRICULUM ISSUES AND INNOVATION IN TECHNOLOGY EDUCATION IN THE 21ST CENTURY

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Abstract
The issues surrounding curriculum and innovation in technology education in this 21st century has increased the focus of relevant stakeholders which has become thoughtful and relevant to Nigerian educational system. This paper examines the matters arising from educational system in the 21st century, the issues in curriculum, innovation in technology needed in the 21st century curriculum. Ways to improve the curriculum was also highlighted and discussions. This paper provides an indication that curriculum undergoing regular transformations have a greater benefit to the educational sector with the ideology good concept, knowledge, skills and contexts. This paper also, noted that curriculum and technological use will impact changes immensely positively with ripple effect across organizations and national boundaries bringing together the collective intelligence of people on Nigeria educational structure.

Keywords: Curriculum Issues, Educators, Innovation in Technology Education

Introduction
The transformation that is being experienced in the world of today has posed a major concern that is multidimensional in nature which affects school curriculum and technological economy in this 21st century. Curriculum is a total guided learning experiences designed to facilitate learners learning for establishing quality relationship between what is learnt and what operates outside the school. The United Nations Educational, Scientific and Cultural Organization (UNESCO ,2018) described curriculum in two way as formal curriculum, which is a planned programme of objectives, content, learning experiences, resources and assessment offered by a school. It is sometimes called the 'official curriculum'. While the hidden curriculum involves all the incidental lessons that students learn at school. It is sometimes called the 'unofficial curriculum' and includes the lessons about behaviour, personal relationships, the use of power and authority, competition, sources of motivation and so on that students learn at school. These lessons can be either positive or negative in terms of promoting a sustainable future.

Ivowi, U. M. O. (1993) emphasizes that a school with a comprehensive recycling policy and strict rules about non-violent resolution of conflict teaches students important lessons about the social and ecological dimensions of sustainable development. However, a school that over-emphasizes elite academic performance at the expense of the personal, social and artistic aspects of student development is teaching some lessons about human worth that do not support an ethic of sustainability (Agile, H. E., 2018).

UNESCO (2015) annual Report on technology in the United States of America education focuses on a variety of issues trying to bring technology in education to the forefront. The 2019 report examines data collected from over 700 educators on their perception on innovations and these technology solutions impact on the educational setting. The report offers a spotlight on what is occurring in our classrooms related to innovations and their impact on students. For educators working with struggling learners does not believe the continued expansion of new technologies into U.S. schools is transforming education. In fact, the new nationally representative survey of 700 educators conducted by the Education Week Research Center shows that fewer than one-third of America's teachers said education-technology innovations have changed their beliefs about what school should look like. To change that dynamic, some school and district leaders are turning to innovation lessons from the business world, which tends to be more open to risk taking; education companies are trying to do a better job solving problems for schools; and teachers are showing how experimentation with digital tools can improve classroom instruction.

Educational System in Nigeria compared in the 21st century

Federal Republic of Nigeria (FRN, 2015). Nigerian educational system has undergone major structure changes over the last 30 years. Before and after the 1960 Nigerian independence the Educational System at the primary and secondary levels mirrored the British system, i.e. 6 years of primary education and 5 years secondary and 2 years of higher level / A Levels.

In 1973, the educational system was updated to the 6-3-3-4 (6 years primary, 3 years junior secondary, 3 years of senior secondary and 4 years tertiary education) similar to the American system.

In 1982 the first National Policy on education was developed and adopted. Since this period, the educational system has witnessed a lot of changes and modifications at various levels.

In 2005, the Nigerian government adopted a national Basic Education Curriculum for grades 1 through 9. The policy was an outgrowth of the Universal Basic Education program announced in 1999, to provide free, compulsory, continuous public education for these years. In 2014, the government implemented a revised version of the national curriculum, reducing the number of subjects covered from 20 to 10. The above gives a narrative of the educational system in Nigeria as compared with the Australian Curriculum that took effect nationwide in 2014, after a curriculum development process that began in 2010. Previously, each state's Education Department had traditionally established curricula. The Australian Curriculum consists of one curriculum covering eight subject areas through year 10, and another covering fifteen subjects for the senior secondary years. Meanwhile, the National Curriculum of Korea covers kindergarten, primary, secondary, and education. The version currently in place is the 7th National Curriculum, which has been revised in 2007 and 2009. The curriculum provides a framework for a common set of subjects through 9th grade, and elective subjects in grades 10 through 12.

21st Century Issues in curriculum

There are many problems encountered in developing a curriculum project. Resistance to change within the system is in itself a major problem to introducing new ideas in the curriculum of schools (Samuel Amadioha, 2016). Four major problems show the frustrations that militate against the implementation of a well-conceived idea. The comparative education and adaptation centre (CESAC) met with some problems in its effort to improve education at the secondary school level through curriculum development and innovation as it relates to finance, support, implementation and social factors.

(a) Inadequate funding has affected the development of its curriculum project. Government subvention has not helped much and the maintenance and development of the project for the school system has to go on. To survive, it had to make in-roads into publishing on partnership basis with publishers of its instructional materials who were handling various projects. Very few people are ready to give financial grants to curriculum project. Foundations or endowments are non-existent and all these sort of discourage the center.

(b) The idea support does not catch on quickly or easily. The change inertia normally associated with a system is a problem CESAC has to cope with. The supports given by some individuals, ministry officials or school administration are lukewarm as they readily agree but do not put it into actual practice.

(c) Ivowi, U.M.O. (1993) postulates that even teachers agree to implement programmes after attending orientation courses but refuse to operate the same programmes when it actually comes to the real action. Problems of implementation has to do with no infrastructures e.g. personnel, space and hardware's (equipment for teaching) sometimes programmes have had to be forgotten because of transfer of dedicated educators or low quality equipment that cannot be used. There is also inadequate supply of software's like books and lack of effectiveness in teaching. This has to do with ignorance of the philosophy and objectives of the projects, the educators' unpreparedness and partial fulfillment of the provisions of the project.

(d) Social forces form an impediment to the development of the centers projects. (1) The value of educators. (2) The structure for educators. Gone are the days when the teaching profession was held in high esteem. The image of the educator's is still low and people pick on the teaching profession as a second or alternative choice. Some educators see teaching as a temporary occupation and are not committed the structure for educators have made experienced educators to leave the classroom whilst the less experienced ones do not contribute effectively as expected for curriculum innovation.

Innovation in Technology Education *Needed in the 21st century Curriculum*

In many cases, educators develop their own curricula, often refining and improving them over years, although it is also common for educators to adapt lessons and syllabi created by other educators use curriculum templates and guides to structure their lessons and courses, or purchase prepackaged curricula from individuals and companies. In some cases, schools purchase comprehensive, multigrade curriculum packages often in a particular subject area, such as metalwork that educators are required to use or follow (UNESCO, 2010). Curriculum may also encompass a school's academic requirements for graduation, such as the courses students have to take and pass, the number of credits students must complete, and other requirements, such as completing a project or a certain number of community-service hours. Generally speaking, curriculum takes many different forms in schools too many to comprehensively catalog (Mercier, E., Vourloumi, G., and Higgins, S. 2017).

Also, it is important to note that while curriculum encompasses a wide variety of potential educational and instructional practices, educators often have a very precise, technical meaning in mind when they use the term. Most educators spend a lot of time thinking about, studying, discussing, and analyzing curriculum, and many educators have acquired a specialist's expertise in curriculum development i.e., they know how to structure, organize, and deliver lessons in ways that facilitate or accelerate student learning. To non-educators, some curriculum materials may seem simple or straightforward (such as a list of required tools, for example), but they may reflect a deep and sophisticated understanding of an academic discipline and of the most effective strategies for learning acquisition and classroom management *(Open Jar Foundation, 2012).*

Since curriculum is one of the foundational elements of effective schooling and teaching, it is often the object of reforms, most of which are broadly intended to either mandate or encourage greater curricular standardization and consistency across Federal, States and local government areas schools, grade levels, subject areas, and courses. As a way to be innovative in our day to day technological system in education is to eliminate deviation by adopting the model of good concept, knowledge, skills and contexts as presented in Figure 1 below for meaningful progress to be achieved as an innovation into the technological educational system.

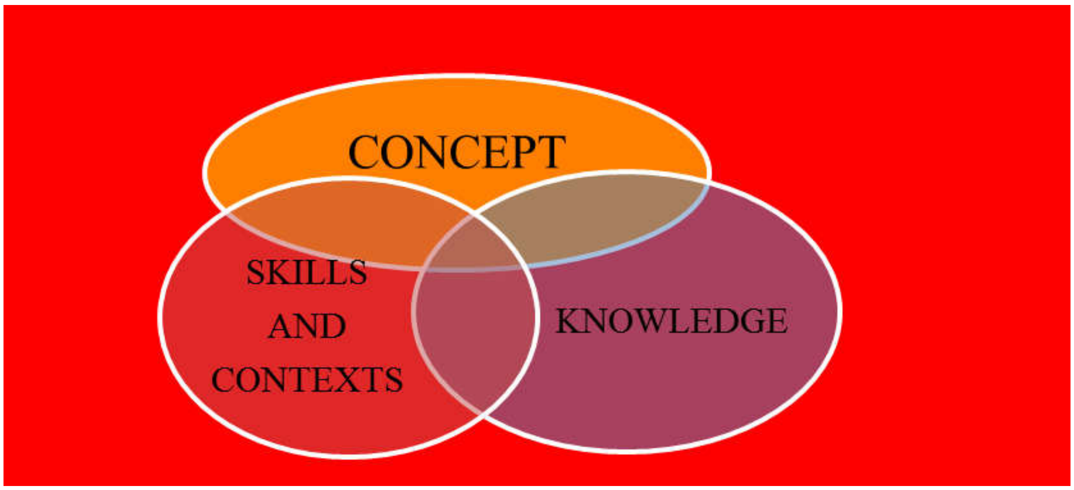

Fig 1: Innovation in Technology Education *Curriculum*

Ways to Improve Curriculum in the 21st century

Samuel (2016) is of the view that the following are few representative examples of the ways in which curriculum is targeted for improvement in this 21st century or used to leverage school improvement and increase Educator effectiveness as **Curriculum scripting, Standards requirements, Assessment requirements, Curriculum standardization, Curriculum alignment, Curriculum philosophy, Curriculum resources and Curriculum packages.**

- **Curriculum scripting:** Often called "scripted curriculum," the scripting of curriculum is the most prescriptive form of standardized, prepackaged curriculum, since it typically requires educators to not only follow a particular sequence of preprepared lessons, but to actually read aloud from a teaching script in class. While the professional autonomy and creativity of individual educators may be significantly limited when such a curriculum system is used, the general rationale is that teaching quality can be assured or improved, or at least maintained, across a school or educational system if educators follow a precise instructional script. While not every educator will be a naturally excellent educator, the reasoning goes, all educators can at least be given a high-quality curriculum script to follow. Scripted curricula tend to be most common in local areas and schools that face significant challenges attracting and retaining experienced or qualified educators, such as larger urban schools in high-poverty communities.

- **Standards requirements:** When new learning standards are adopted at the state, Local area, or school levels, educators typically modify what they teach and bring their curriculum into "alignment" with the learning expectations outlined in the new standards. While the technical alignment of curriculum with standards does not necessarily mean that educators are teaching in accordance with the standards or, more to the point, that students are actually achieving those learning expectations, learning standards remain a mechanism by which policy makers and school leaders attempt to improve curriculum and teaching quality. The Common Core State Standards Initiative, for example, is a national effort to influence curriculum design and teaching quality in schools through the adoption of new learning standards by states.

- **Assessment requirements:** Another reform strategy that indirectly influences curriculum is assessment, since the methods used to measure student learning compel teachers to teach the content and skills that will eventually be evaluated. The most commonly discussed examples are standardized testing and high-stakes testing, which can give rise to a phenomenon informally called "teaching to the test." Because federal and state policies require students to take standardized tests at certain levels, and because regulatory penalties or negative publicity may result from poor student performance (in the case of high-stakes tests), educators are consequently under pressure to teach in ways that are likely to improve student performance on standardized tests e.g., by teaching the content likely to be tested or by coaching students on specific test-taking techniques. While standardized tests are one way in which assessment is used to leverage curriculum reform, schools may also use rubrics and many other strategies to improve teaching quality through the modification of assessment strategies, requirements, and expectations.

- **Curriculum standardization:** Federal, States and local areas schools may also try to improve teaching quality and effectiveness by requiring, or simply encouraging, educators to use either a standardized curriculum or common processes for developing curriculum. While the strategies used to promote more standardized curricula can vary widely from Federal, States and local areas schools, the general goal is to increase teaching quality through greater curricular consistently. School performance will likely improve, the reasoning goes, if teaching methods and learning expectations are based on sound principles and consistently applied throughout a Federal, States and local areas schools. Curriculum standards may also be created or proposed by influential educational organizations. For example with the purpose of guiding learning expectations and teaching within particular academic disciplines.

- **Curriculum alignment:** Schools may try to improve curriculum quality by bringing teaching activities and course expectations into "alignment" with learning standards and other school courses a practice sometimes called "curriculum mapping." The basic idea is to create a more consistent and coherent academic program by making sure that educator teach the most important content and eliminate learning gaps that may exist between sequential courses and grade levels. For example, educators may review their metalwork program to ensure that what students are actually being taught in every introduction to foundry course offered in the school not only reflects expected learning standards for that subject area and grade level, but that it also prepares students for foundry practical works. When the curriculum is not aligned, students might be taught significantly different content in each foundry practical works, for example, and students taking different introduction to foundry courses may complete the courses unevenly prepared for foundry practical works.

- **Curriculum philosophy:** The design and goals of any curriculum reflect the educational philosophy whether intentionally or unintentionally of the educators who developed it. Consequently, curriculum reform may occur through the adoption of a different philosophy or model of teaching by a school or educator. Schools that follow the Expeditionary Learning model, for example, embrace a variety of approaches to teaching generally known as project-based learning, which encompasses related strategies such as community-based learning and authentic learning. In Expeditionary Learning schools, students complete multifaceted projects called "expeditions" that require educators to develop and structure curriculum in ways that are quite different from the more traditional approaches commonly used in schools.

- **Curriculum resources:** The resources that schools provide to educators can also have a significant effect on curriculum. For example, if a Federal, States or local government areas schools purchases a certain set of textbooks and requires educators to use them, those textbooks will inevitably influence what gets taught and how educators teach. Technology purchases are another example of resources that have the potential to influence curriculum. If all students are given laptops and all classrooms are outfitted with interactive whiteboards, for example, educators can make significant changes in what they teach and how they teach to take advantage of these new technologies. In most cases, however, new curriculum resources require schools to invest in professional development that helps educators use the new resources effectively, given that simply providing new resources without investing in educator's education and training may fail to bring about desired improvements. In addition, the type of professional development provided to educators can also have a major influence on curriculum development and design.

- **Curriculum packages:** In some cases, schools decide to purchase or adopt a curriculum package that has been developed by an outside organization. One well-known and commonly used option for American public schools is International Baccalaureate, which offers curriculum programs for elementary schools, middle schools, and high schools. Federal, States and local government's areas schools may purchase for example, all three programs or an individual school may purchase only one, and the programs may be offered to all or only some of the students in a school. When schools adopt a curriculum package, educators often receive specialized training to ensure that the curriculum is effectively implemented and taught. In many cases, curriculum packages are purchased or adopted because they are perceived to be of a higher quality or more prestigious than the existing curriculum options offered by a school or independently developed by educators.

Recommendation

1. Curriculum Relevance: Issues about the relevance of the curriculum for the needs of Nigerian society have been indirectly referred to in the context of the failure to teach science, technology, and business studies effectively. The country needs to pay much greater attention to the development of high-level skills through post-graduate training for the production of new knowledge to meet the needs of Nigerians in their daily lives and for national survival in the global economy.

2. Funding: Government funding of education has been inadequate. The revenue collected through fees constitutes an insignificant proportion of the revenue of the institutions. Inadequate funding of education has been one of the most significant causes of the low access and quality of much of the education offered at all levels. A sustainable financing arrangement must be developed if Nigeria is to regain the ground it has already lost and

become a serious player in the new global economic, social and political order. Financial efficiency is critical and could be attained through the improvement of administrative and management practices, much better and more realistic planning.

3. Appropriate quarterly and fully transparent inspection and assessment should be performed in all level of educational institutions with regards to the favorable schooling environment that should be readily available for educators and students to undertake meaningful activity.

4. Leaders in various levels of education institutions in Nigeria should request the assistance of the Ministry of Education to purchase any technologies for teaching and learning which can enhance assimilation of students in various subjects.

5. The Ministry of Education as to equally establish several engagement procedures that effectively enable all stakeholders at all levels of our educational structure to understand the essence of Educational Technology in this 21st century and how to use various Educational Technology to help educational activities.

Conclusion

The famous phrase, 'the medium is the message' as coined by Marshall McLulan, a Canadian professor in 1964 which strongly proposes that the means to everything is sometimes the end. This statement of expression could immensely be related and applied to the idea of educational curriculum and technological issues and its direct impact on all level of our education in the 21st century. Educational curriculum has become an agent of immense change as presented in this paper. The changes that come with the implementations of the recommendations will have a significant ripple effect on Nigerian educational structure. Several Research findings had shows that, over the next decade advanced technologies will put education within the reach of many more individuals around the world, and will allow greater specialization in curriculum and teaching methodologies than ever before. With these benefits comes the challenge of ensuring that all levels of educational infrastructure and operations are in place to support the adoption of technology in the learning environment. budget funds are to weighed carefully by administrators on how it is spent, decide positive emerging technologies that is most promising, and determine how best to support these technological advances while avoiding the pit holes.

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PRAGMATIC APPROACH TO TVET AS A WAY FORWARD TO SECURITY CHALLENGES IN NIGERIA.

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Abstract
The paper focused on pragmatic approach to Technical and Vocational Education and Training (TVET) fas a way forward to security challenges in Nigeria. It examined the concept of TVET and youth's unemployment and national security. The introduction of TVET in national curriculum and the ugly situation as to the enrollment of candidates in the real TVET practical oriented that would have propel Nigeria into a productive Nation. The authors view TVET has as a strong catalyst to development and sustainable national security because of its potentials in wealth creation and poverty reduction. Recommendations were made among which are provision of adequate tools and facilities for TVET to be adequately repositioned. effective monitoring and evaluation of the implementation of TVET programmes by government agencies is very important for TVET programmes and value re orientation of Nigerian youths to be more responsive to Nigeria State.

Introduction

The rate of insecurity in Nigeria today is coming at an alarming rate and this problem deserve a holistic review. The series of security crises comes in different form and magnitude among which include the menace of insurgency, kidnapping, human trafficking, election crises, assassination, yahoo yahoo, and armed robbery. Some of these crises have been with us from time immemorial and several governments have introduced several measures to curb the menace but non has dealt with the crises in a decisive manner. Several researchers have also advocated several measures among which are qualitative education as an option to curb the crises since the main purpose of education is to assist an individual to have proper direction and guidance for their own benefit and that of the society (Okeke, 2003). This is an indication that if education is adequately inculcated in the society, individuals would meaningfully help themselves and positively contribute to the development of their community. But recent happening has shown that general education has failed to provide appropriate skills, abilities and competencies to co-exist. This calls for a practical and functional education that will make the graduates self reliant and contribute to the development of the society. The rate of unemployment might not be too far from the problem of insecurity currently being experienced in Nigeria. This is because economic and development sustainability depend on opportunity that is avail in the outcome of investment in education. This was corroborated by Oppong (2013) who reported that over supply of university graduates, mis-alignment of the educational system output, inadequate practical training and inelastic labour absorptive capacity in both the private and public sectors is causal factors of graduate unemployment. Also, Madoui (2015) asserted that the disconnection between the university education system and the world of work is the striking cause of graduate unemployment. This is an indication that the skills acquired from the Nigerian educational institutions appeared irrelevant to the need of the society. In consequence, some of the predicament we faced today in terms of insecurity problem may be linked to gap in skills acquired in our educational institutions and skills requirement set by employers in the working environment. In essence, education remains the single factor that guarantees both individual growth and community development. Thus, if an individual acquires skills and the right attitude, and put the skills into use for the benefit of the society, it means that education has helped to change the individual for good.

In the light of the above assertion, what is required in Nigeria for security of lives and property that will reinforce co-existence is the education system that place emphasis on knowledge, skills and values that are based on Nigerian setting in which the learners will live and work. The form of education that give recognition to and put emphasis to pragmatic attitude as a priority is Technical and Vocational Education and Training (TVET). TVET is the form of education that advocates development of the head (*knowledge*), training of the hand (*dexterity*) and enriching the heart (*conscientiousness and painstaking*) (Okoye, and Chijioke, 2013). Though, Verdon, (1996) reported "TVET has then been associated historically with those classes of society who have to work for a living and who do not partake of the kind of education fit for the gentry, even if the greatest experience and ability is required in order to practise an occupation. A conception of what a worthwhile life could be has thus been implicitly shaped around the ideal of cultivated leisure. Working for a living has traditionally been thought in many societies to be undignified and not a worthwhile way of spending one's time. This view was reinforced in classical and neoclassical economic theory through the idea that work is a disutility and needs to be compensated for". The initial restricted expansion of education, that laid emphasis on production of officials for government businesses developed a stratum of work force who could manage the complex literacy dependent of running an industrial and financial economy turned out that the kind of liberal education offered to them was not for the current challenges.

But it is almost inevitable that there will be a tension between the expectations of new strata of society brought into education which probably culminated into the present challenges of insecurity. This was a problem of which the earlier advocates of mass education like Wilhelm von Humboldt, Adam Smith and John Stuart Mill were aware (Benner, 2003). Neither of these authors, however, paid much attention to TVET. They assumed that a good general education was a sound basis for citizenship even if it was not always necessary for employment. This omission is a legacy which some developed countries have, with varying success, struggled to overcome in their development of TVET. A particular problem has arisen over the perceived discontinuity between TVET and liberal education. Where the discontinuity has been institutionalized, problems of the attractiveness of TVET have become particularly acute especially in Nigeria. Thus, the system of education needed for the argumentatively, the transformation from rhetoric to value-oriented form of education appears to be only viable with TVET, the education form which emphasis is on knowledge, skill, value and product.

Nigeria TVET Enrolment

According to UNESCO Institute of Statistics (2006), African countries were grouped into three categories when judged on the basis of percentage enrolment of TVET institutions against the total enrolment of conventional secondary school programmes in 2005. The first group of 10 countries according to the ranking scores included Rwanda (34%), Cameroon, Democratic Republic of Congo, Egypt, Libya, Mauritius, Benin, Algeria and Mali all with a percentage of vocational/technical schools' enrolment to conventional secondary schools' enrolment up to 10% or more. The second group had a proportion of vocational/technical schools' enrolment to general secondary education enrolment between 5% and 9%. These groups of countries include Burkina-Faso, Burundi, Djibouti, Mozambique, and Tunisia, 8% each, Botswana, Morocco, South Africa, Cape-Verde, and Togo 5% each. The third group of countries had percentage enrolment in technical/vocational schools of the total students of secondary school programmes less than 5%. These countries included Mauritania (4%), Uganda (4%), Niger, Ethiopia, Ghana, Guinea-Bissau, Zambia, Chad, (Revamping Technical Vocational Education & Training through Public-Private Partnerships) Eritrea, Gambia, Kenya, Lesotho, Sao-tome, Senegal and Sudan, 1% each. It is disheartening to find that Nigeria did not feature in any of these three categories, implying that her enrolment was less than 1%. This is an indication of stagnation of long proportion of students enrolled in TVET programmes and overall poor public training capacity. TVET has failed to absorb many school leavers who would have had opportunities to make useful contributions to the development of the society. The same UNESCO in her 2019 annual report on Nigeria enrolment in TVET in collaboration with the National Board for Technical Education (NBTE), Nigeria, gave a very worrisome out come as presented in table 1 below.

Table 1 Nigeria Participation in TVET by Institution and Number

Institution	*Education level*	*Ministry Responsible*	*Number of Institutions*
Technical Colleges	Lower/Upper secondary	NBTE/Ministry of Education	171
VEIs/IEIs	Tertiary	NBTE/Ministry of Education	235
Monotechnics	Tertiary	NBTE/Ministry of Education	99
Polytechnics	Tertiary	NBTE/Ministry of Education	123

UNESCO 2019

Meanwhile the same document emphasises the usefulness of TVET in Nigeria at aiming to assist the federal and state education authorities in their effort to revitalize, reform and expand the provision of skills, vocations, science and technology to meet the nation's present and future socio-economic needs. But the above data from UNESCO has proved that Nigeria is yet to brace up with the realities of curbing the security challenges. The common saying that an idle hand is the devil's workshop is becoming imperative. Nigeria should realise that investments in TVET is decisive in determining whether a society is able to build up, and get secured for prosperity. Investment in TVET is therefore an investment in the future itself, and especially investment in people's minds. TVET shapes people's identity and empower individuals to be useful members of the society. TVET also has peace-building effects, which means that any nation that promote TVET is making a lasting contribution to peace, security and development. Unfortunately, the attention given to TVET is not as expected. In her effort to integrate TVET in the curriculum, the Nigeria government in 2011 made it compulsory for every secondary student to offer one trade subject as a compulsory subject within thirty-six subjects proposed as trade subject. But it is disheartening to note that the traditional practical subjects that can easily make the candidate self-employed and propel Nigeria into production economy instead of being a consuming nation are in the least of subjects being offered by candidates. The data obtained from National Examinations Council (NECO) 2019 show the number and percentage of candidates that register for practical trade subjects as against marketing as a subject.

Table 2 Some Selected Registered Trade Subjects in NECO 2019 SSCE

S/N	*SUBJECT*	*NUMBER REGISTERED*	*PERCENTAGE REGISTERED*
1	Auto Mechanics	229	0.020
2	Electronics	261	0.022
3	Building Construction	697	0.060
4	Wood Work	504	0.043
5	Visual Art	3,462	0.298

6	Music	163	0.014
7	Auto Electrical Work	10	0.001
8	Auto Body Repairs and Spray Painting	22	0.002
9	Auto Parts Merchandising	08	0.001
10	Machine Woodworking	65	0.006
11	Air Conditioner and Refrigeration	40	0.003
12	Plumbing and Pipefitting	204	0.018
13	clothing and textiles	85	0.007
14	GSM Maintenance and Repair	513	0.044
15	Marketing	490,312	42.152

NECO, 2019

The above information in table 2 show some selected subjects registered by candidates in 2019 NECO Senior School Certificate Examination (SSCE). The data compare the enrolment in marketing with 42.15% of the candidates, out of 1163194 that register for the examination all over the federation offer the subject at the expense of subjects that should have produce product to market. Though several reasons may be adduced to this problem which may range from lack of instructor's, poor funding, lack of orientation as to what benefit practical trade subjects tend to offer, lack of equipment and tools, and lack of patience to resist the training stress. Orikpe, (2013) commended the introduction of TVET into the curriculum at the various levels of education in Nigeria as a welcome innovation that will go a long way in strengthening the popular liberal education. Orikpe, (2013) further stated that what is required by the government at various levels now is to adequately provide the needed human and material resources to make these programmes effective and functional. Regrettably, these indicators of neglect, poor and inadequate provisions for skills acquisition through TVET system makes it relatively difficult to achieve the goal of TVET in the country. What is obvious according to Bukit, (2006) is that there is structural shift of worldwide economy as a result of science and technology innovations. This policy shift has changed and affected the characteristics of labour market which currently seeks for labour force with sellable skills. It is a belief that if students are adequately provided for in knowledge and skills, they will not only secure paid employment but could as well become self-employed and economically productive which is imperative to a secured environment.

TVET and National Security Challenges

Insecurity in Nigeria is a major issue in the public today, though a wide holistic view will see it as a global issue that requires comprehensive and committed contribution of all in other to curb the menace. One of such is the education sector of which TVET play a major role. Though it will be appropriate to note that several policies have been put in place to curb the problem one of which is the introduction of TVET in the curriculum of SSCE in Nigerian as reported by Orikpe, (2013)**.** But Ogbunaya and Udoudo, (2015) reported that national security policy would be of no use to the unemployed and hungry citizens that constitute the majority of the population in a poor country like Nigeria. While, Osakwe (2013) noted that some schools of thought emphasize on human security in the context of national security. Osakwe (2013) further explained that it is the concept of human security that encompasses the protection of lives and property, a pre-condition for the improvement of people's wellbeing, protection of human rights, and the provision of basic human needs.

There is a very close relationship between youths' unemployment and national security, which TVET main objective is to proffer solution to. According to Adebayo (2013), unemployment in Nigeria poses many social, economic, political and psychological consequences, which directly and indirectly impacts on national security. Some of the social consequences of the high level of youths' unemployment on national security is that it encourages the development of street youths and urban miscreants. TVET increases the potential for individuals to perform as citizens. There are many examples of the public being misinformed and making bad decisions. However, without TVET, the situation would definitely deteriorate. TVET gives one the ability to critically examine issues and articulate a reasoned position about it and developing critical thinking is a key component of TVET.

Orikpe, (2013) Stated that "It is no longer news that liberal education alone has failed to equip youths with requisite skills and attitudes for leading a productive life. It is also no news that graduates of our institutions of higher learning have been populating the crime world due to their inability to secure meaningful employment upon graduation. This scenario calls for the intensification of the emphasis on TVET to equip graduates with occupational survival skills to be able to identify and even create and exploit investment opportunities that abound in the society".

Conclusion

The present cases of insecurity come in different ways and magnitude in different parts of Nigeria, which might not be too far from lack of gainful employment among the youths. This is threat to the very existence of the Nigeria. The efforts of the military and other security agencies have not succeeded in curbing security challenges in Nigeria. There is no doubt that the security situation in the country calls for extraordinary measures to combat it. Functional education option of which TVET becomes the only option comes in handy for the desired peace that Nigeria deserve. It may take a long time and huge resources to achieve but the end is certainly going to justify the means. Nigerians should perceive the TVET option as a new way to reduce the high rate of insecurity in Nigeria.

Recommendations

From the revelation in this paper the following recommendations were made.

- Adequate tools and facilities should be provided for TVET to be adequately repositioned in Nigeria.
- Effective monitoring and evaluation of the implementation of TVET programmes by government agencies is very important for TVET programmes.
- Government at all level should adequately provide fund for proper management of TVET programmes for our youth to become relevant in the society.
- Government should institute reward for excellence in TVET.
- School-industry linkage should be strengthened as a way of encouraging more participation in TVET.
- There should be a paradigm shift from theoretically based education to practically and research-oriented system of education in Nigeria.
- Value re orientation of Nigerian youths to be more responsive to Nigeria State.

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IMPACT OF E-LEARNING ON RETENTION AND ACADEMIC PERFORMANCE OF JUNIOR SECONDARY SCHOOLS STUDENTS IN SOCIAL STUDIES IN KADUNA STATE NIGERIA

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Abstract
This study examined the impact of e-learning on retention and academic performance of upper basic students in Social Studies in Kaduna state Nigeria. The study answered the following questions which are; what is the difference in the mean scores of JSS students taught using e-learning facilities and students taught with conventional lecture method? What is the difference in the mean scores of upper students taught using e-learning facilities in relation to gender? What is the difference in the mean scores of upper basic students taught using e-learning facilities due to locality? The hypotheses were postulated based on the research questions raised. The study is the non-equivalent pre and posttest comparison group in design. The population is JSS Social Studies students from Zaria Education Zone, Kaduna state. Also 90 students of upper basic III were purposively selected. The social studies Achievement Test (SOSAT) is the data collection instrument. The arithmetic means, standard deviation, independent and paired t-test are used as data analysis tools. The study discovered the following: upper basic students taught social studies using e-learning facilities outperformed students taught using conventional lecture method; Male and female Junior Secondary school students taught social studies using e-learning facilities academically performed the same on average; Rural and urban students taught social studies using e-learning facilities performed academically the same on average. The study makes recommendations which include: the need for governments at all levels to ensure the provision and utilization of information and communication technology (ICT) facilities and infrastructures in secondary schools and the need for training and retraining of social studies teachers on the application and effective utilization of ICT facilities for teaching and learning.

Key Words: E-learning, Retention, Academic Performance, Social Studies, Impact.

Introduction

Education is an instrument par excellence for effective national development. Education is a key factor for sustainable development (Chimombo 2005). The significance of education, especially in developing countries, is increasing because of progressing pressure to catch up with the developed world regarding. The attainment of Nigeria's national objectives is anchored to education as enshrined in the National Policy on Education (2004; 2013). Hence education sector in Nigeria needs to be rejuvenated to stand the test of time by accepting new technologies, innovations and inventions that will promote good practices in the sector. The information and communication technology revolution has spread widely like a bush fire to all nooks and crannies of human endeavours including education industry.

Nowadays, ICTs are taking the centre stage in almost every sector of life. They seem to have the solution to most of the problems plaguing educational systems especially in third world countries. World Bank (2006:2) remarks that communication technologies have opened up entirely new horizons in information access and retrieval and are revolutionizing the ways in which people interact, conduct businesses and compete in international markets. Worthy of note is the fact that many Nigerian students use an ICT gadget in one way or the other.

Psychologically, these technologies especially Internet and telephone in particular have change the way people think and behave in society. As a matter of fact, ICTs have potentials to improve teaching and learning as well as harbours a threat to education if poorly welcomed and used Lumadi (2013). E-learning is a reigning and contemporary learning environment for students, thus requiring a different skill set to be successful. Critical thinking, research, and evaluation skills are growing in importance as students have increasing volumes of information from a variety of sources to sort through (New Media Consortium, 2007).

E-learning denotes the use of ICT by teachers and learners. Schmidt (2005) holds that e-learning consists of conventional training, such as courses, ad-hoc training, selected learning objects, formalization through document collections and community formation which can be achieved via social software. Khan (2005) pointed that E-learning has been described in various ways as learning using a number of different technologies and methods for delivery e.g. Computer Based Training (CBT), Internet-based training (IBT), Web-based instruction (WBI), advanced distributed learning(ADL), distributed learning (DL), distance learning, online learning (OL), mobile learning (or m-learning) or remote learning and learning management systems (LMS). Fry 2000 and Wild et al. 2002 describe E-learning as the delivery of training and education via networked interactivity and distribution technologies. Other authors notably Roffe, 2002; Schank, 2002; and Sambrook, 2003 see e-learning simply as learning and communication exercises across computers and networks or for that matter any other electronic sources.

There is a considerable body of evidence to suggest that different teaching delivery styles can have different degrees of success; as measured in terms of academic results (Emerson & Taylor, 2004). In relation to online teaching, some studies indicate that this medium of delivery has a positive impact on performance, for example, Smith and Hardaker (2000). Other studies however, find that greater online teaching has a negative impact on performance (Johnson, 2005). In E-learning system, students are able to interact anytime from wherever with different instructional material (text, sound, pictures, video and so on) through Internet. In addition, learners can communicate with teachers and classmates both individually and as a group discussion with the use of message boards, instant message exchanges and video conferencing (Al-Ammari and Hamad, 2008).

Attitudes concerning e-learning, echoed by scholarly and academic reviews, range from neutral to positive. On one hand, it is noted that e-learning is at least as effective as traditional instructional strategies (Rosenberg, Grad and Matear, 2003), and that there are no major differences in academic performance between the more traditional and more technology-oriented modes of instruction (Cavanaugh, 2001). On the other hand, many reviews go further, reflecting a principally positive attitude towards the impact of e-learning (Mayer, 2003). The current piece sought to demystify e-learning by concentrating on how specific e-learning factors (socio-demographic characteristics, hours spent on-line and prior computer skills) influence individual academic performance. It is based on these that this study evaluates the impact of e-learning on retention and academic performance of upper basic students in basic science and technology Kaduna state, Nigeria.

Objectives of the Study

The main objective of this study is to evaluate the Impact of E-learning on retention and Academic Performance of JSS Students in social studies and Kaduna state-Nigeria. The study is guided by the following specific objectives which are to:

1. Determine the retention and academic performance of JSS students taught using e-learning facilities and students taught using conventional lecture method;

2. Examine the retention academic performance of JSS students taught using e-learning facilities in relation to gender;
3. Ascertain the academic performance of JSS students taught using e-learning facilities in relation to locality.

Research Questions

The study attempts to answer the following questions:

1. What is the difference in the retention and academic performance of JSS students taught using e-learning facilities and students taught with conventional lecture method?
2. What is the difference in the retention and academic performance of JSS students taught using e-learning facilities in relation to gender?
3. What is the difference in the retention and academic performance of JSS students taught using e-learning facilities due to locality?

Null Hypotheses

In the light of the above, it is hypothesized as follows:

$H0_1$: there is no significant difference between the retention and academic performance of JSS students taught using e-learning facilities and students taught with conventional lecture method;

$H0_2$: there is no significant difference between the retention and academic performance of JSS male and female students taught using e-learning facilities;

$H0_3$: there is no significant difference between the retention and academic performance of JSS urban and rural students taught using e-learning facilities.

Methodology

The design of the study is quasi-experimental. Specifically, the non-equivalent comparison group design with pre-test and post-test was used. It has been described as "one of the most commonly used quasi-experimental designs in educational research" (Cohen, Manion & Morrison, 2007). This assert Best and Kahn (2006) is often the case since students are naturally organized in groups as classes within schools and are considered to share similar characteristics. The non-equivalent control group design with pretest and posttest in this study is represented as:

Experimental Group: NR O_1 X O_2

Control Group: NR O_1 O_2

The NR represents non-randomization, O_1 represents pretests, X represents the treatment implemented, and O_2 represents posttests (Cohen et al., 2007).

The population of the study consisted of all JSS students in Kaduna metropolis, Kaduna state, Nigeria. There are 24543 students at upper basic level based on the official data collected from Zaria Education Zonal office. The study sample was 90 students selected from two different schools. Purposive sampling technique guided the selection of the sampled schools; Government Junior Secondary school, Tudun-jukun, Zaria and Government Junior Secondary School, Aba.

The study used teacher-made achievement test titled "Social Studies Achievement Test" (SOSAT) as data collection instrument. The instrument consisted of thirty (30) questions structured into three sections of ten (10) questions each as follows; section 'A' Multiple Choice, section 'B' Fill-in-the Blank Spaces and section 'C' Matching Test. The instrument was duly validated by experts in basic science and Test and Measurement. In order to ascertain the consistency and stability of the instrument, pilot study is conducted at Demonstration Secondary school Federal College of Education, Zaria using 15 JSSIII students. The rationale for pilot study observes Salihu (2015) is to forestall any problem that might arise during the actual study and thereby jeopardize the validity and reliability of the test, acquaint the researcher with test administration procedure and practical problems involved in carrying out the study so as to rectify them and to assess the relevance and functionality of the research questions and hypotheses. The set of the data obtained from the instrument is used to determine the reliability co-efficient of the research instrument. The Guttmann Split half procedure is used to determine the reliability coefficient of the instrument and 0.87 is obtained.

The data for the study are the scores of the Teacher-Made Achievement Test obtained from the pre-test and post-test administered to the experimental and control groups. The research questions raised by the study are answered using arithmetic mean and standard deviation. The t-test independent sample and paired t-test are used to validate the null hypotheses at 0.05 level of significance. According to Ekeh (2003), t-test is used for determining the significant difference between two mean.

RESULTS AND DISCUSSIONS

Answering Research Questions

Tables 1-3 present answers to the questions posed by the study. The descriptive statistics of arithmetic mean and standard deviation were used as tools for data analysis.

Research Question One: What is the difference in the retention and academic performance of JSS students taught using e-learning facilities and students taught with conventional lecture method?

Table 1: Mean scores of academic performance of JSS students in experimental and control groups

Variable	Groups	N	Mean	Std. Dev.
Academic Performance	E-learning	45	47.76	**3.432**
	Lecture Method	45	42.38	**4.962**

The result in table 1 showed the mean academic performance and retention scores of JSS students taught using e-learning facilities (47.76) and students taught using conventional lecture method (42.38). The results showed that upper basic students taught using e-learning facilities had higher mean score than students taught using conventional lecture method. The mean difference is 5.38.

Research Question Two: What is the difference in the retention and academic performance of JSS students taught using e-learning facilities in relation to gender?

Table 2: Mean scores of male and female JSS students taught using E-learning facilities

Variable	Gender	N	Mean	Std. Dev
Academic	Male	24	48.42	**3.120**

Performance	Female	51	47.45	**3.557**

Details in table 2 shows the mean retention and academic performance scores of male and female JSS students taught using e-learning facilities. The male students had higher mean score of 48.42 against 47.45 by the female counterparts. The mean difference is 0.97.

Research Question Three: What is the difference in the retention and academic performance of JSS students taught using e-learning facilities due to locality?

Table 3: Mean scores of urban and rural JSS students taught using e-learning facilities

Variable	Location	N	Mean	Std. Deviation
Academic	Rural	30	47.07	**3.591**
Performance	Urban	45	48.22	**3.281**

Results from table 3 shows the mean retention and academic performance scores of rural and urban JSS students taught using e-learning facilities. The urban students had a higher mean score than the rural students. The mean difference is 1.15.

Test of Null Hypotheses

Presented in tables 4-6 are inferential statistics to determine the existence of significant difference between the variables indicated in the null hypotheses. Independents sample t-test and paired t-test were used to test the null hypotheses at 0.05 level of significance.

$H0_1$: there is no significant difference between retention and academic performance of JSS students taught using e-learning facilities and students taught with conventional lecture method;

Table 4 independent sample t-test on mean retention and academic performance of JSS students in the experimental and the control groups

Methods of Instruction	Mean	Std.Dev	DF	t-value	P	Decision
E-learning	47.76	3.432				**Rejected**
			163	7.942	.000	
Lecture Method	42.38	4.962				

(t-critical = 1.96)

Details in table 4 revealed that students in the experimental group who were taught social studies using e-learning facilities significantly outperformed their students who were taught with conventional lecture method of teaching (P < 0.05). By this observation, the null hypothesis which states that there is no significant difference between retention and academic performance of JSS students taught using e-learning facilities and students taught with conventional lecture method is therefore rejected.

$H0_2$: there is no significant difference between the retention and academic performance of JSS male and female students taught using e-learning facilities;

Table 5 paired t-test on mean academic performance of male and female students in the experimental group

Gender	N	Mean	Std. Dev	DF	t-value	P	Decision
Male	24	48.42	3.120	73	1.139	.258	**Accepted**
Female	51	47.45	3.557				

(t-critical = 2.000)

Details in table 5 showed that the male students' performance in the test is higher than that of the female students involved in the experiment. But the observed variability is not statistically significant ($P > 0.05$) The observed t-values (1.139) is lower than the critical value of 2.000 and the probability level of significance (0.258) observed in the table for the tests are all higher than 0.05. Therefore the null hypothesis which states that there is no significant difference between the mean scores of male and female JSS students taught using e-learning facilities is thus accepted.

$H0_3$: there is no significant difference between the retention and academic performance of JSS urban and rural students taught using e-learning facilities.

Table 6: paired t- test on mean academic performance of urban and rural students in the experimental group

Location	N	Mean	Std. Dev	DF	t-value	P	Decision
Rural	30	47.07	3.591	73	1.439	.154	**Accepted**
Urban	45	48.22	3.281				

(t-critical = 2.000)

The result of the test in table 6 showed that the urban students had relatively higher mean score than rural students. But this variability was not found to be statistically significant ($P > 0.05$). This means that the null hypothesis which states that there is no significant difference between the mean scores of urban and rural JSS students taught using e-learning facilities is therefore accepted.

Major Findings

The study in the light of the above discovered the following:

1. JSS students taught basic science and technology using e-learning facilities outperformed students taught using conventional lecture method;
2. Male and female JSS students taught social studies and technology using e-learning facilities academically performed the same on average;
3. Rural and urban JSS students taught social studies using e-learning facilities performed academically the same on average.

Discussion on Findings

The study in the light of the above discovered the following: JSS students taught social studies using e-learning facilities outperformed students taught using conventional lecture method; male and female Junior Secondary school students taught social studies using e-learning facilities academically performed the same on average; rural and urban Junior Secondary School students taught social studies using e-learning facilities performed academically the same on average. Corroborating the current findings, Calderoni (1998) revealed that academic advantages over traditional classroom instruction were demonstrated by students in Mexico's Telesecundaria program, who were "substantially more likely than other groups to pass a final 9th grade examination" administered by the state; by students taking a chemistry by satellite course (Dees 1994); and by students learning reading and math via interactive radio instruction (Yasin & Luberisse 1998). Similarly, Kurt and Somchai (2004) reported that students participated more in the classroom activities and gained content knowledge when a constructivist approach was used. In the study, e-learning strategy is classified as one of those constructivist approaches.

In a similar investigation Young and Collins, (2003) reported that the traditional teacher as information giver and textbook guided classroom has failed to bring about the desired outcome of producing thinking students. This finding is consistent with Yerima (2007), where he opined that effective teaching methods stimulate students' interest in a topic, which is the bases for achieving desired objectives and it may encourage their initiatives and curiosity. This finding is line with Min-Rik (2007), who opined that the use of the strategy is expected to have equal impact on the users. In the report it is opined that specific e-learning helps in certain research and in decision-making irrespective of the individual gender. The report stated that the strategy offer excellent discovery learning techniques that often give insight or 'gestalts' not gained through more traditional didactic methods.

On one hand, it is noted that e-learning is at least as effective as traditional instructional strategies (Rosenberg, Grad and Matear, 2003), and that there are no major differences in academic performance between the more traditional and more technology-oriented modes of instruction (Cavanaugh, 2001). On the other hand, many reviews go further, reflecting a principally positive attitude towards the impact of e-learning (Mayer, 2003). In relation to online teaching, some studies indicate that this medium of delivery has a positive impact on performance, for example, Smith and Hardaker (2000). Other studies however, find that greater online teaching has a negative impact on performance (Johnson, 2005).

Conclusions

In the light of the above, this study concludes that e-learning is an effective instructional strategy for enhancing teaching and learning in JSS in social studies Kaduna state, Nigeria. The e-learning can be said to be gender and environmental friendly as it shows to be effective for all sexes in all locations.

Recommendations

This study recommends as follows:

1. There is the need for governments at all levels to ensure the provision and utilization of information and communication technology (ICT) facilities and infrastructures in secondary schools. This will encourage teachers of social studies and others from various subject areas to utilize it to promote effective transaction and communication between teachers and the students;

2. There is also the need for training and retraining of social studies teachers and others from various subject areas on the application and effective utilization of ICT facilities for teaching and learning;

3. Social studies teachers should be motivated to use ICT-based facilities in the teaching and learning process in order to facilitate effective transaction and communication in the teaching and learning process.

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ASSESSMENT OF THE IMPLEMENTATION OF BASIC SCIENCE AND TECHNOLOGY CURRICULUM IN JUNIOR SECONDARY SCHOOLS, NIGER STATE.

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Abstract
This research work assessed the Basic Science and Technology curriculum implementation in Junior Secondary Schools in Niger State, Nigeria. The study was conducted using four objectives which were translated in to research questions. Descriptive survey design was adopted with sample size of 60, which were randomly selected across the 30 junior secondary in Bosso and Chanchanga Local Government Areas. The instruments used for data collection were questionnaire titled Assessment of Basic Science and Technology Curriculum Implementation Questionnaire. Mean, Standard Deviation and frequency and percentage were used for descriptive analysis. The research findings from this analysis reveals that: the Basic Science and Technology curriculum content is not being properly implemented; most of the Basic Science and Technology institutional material are not available and the few that are available are not adequate. Based on these findings five recommendations were proffered which include; all people concerned with the implementation of Basic Science and Technology curriculum content should be actively involved and committed to ensure the effective implementation of Basic Science and Technology curriculum in Nigeria, Basic Science and Technology teachers need to be conversant with the appropriate and newly discovered teaching methods and strategies and as well employ them while teaching Basic Science and Technology, Basic Science and Technology instructional materials and resources should be made available to the schools, there is need to consider teacher motivation, and provide adequate classrooms for Basic Science and Technology lessons and Quality assurance officials should put more effort and perform their duties accordingly.

Key words: Assessment, Basic science and Technology, Curriculum, implementation

Introduction

Basic Science and Technology is one of the subjects offered at junior secondary school level of Nigeria education. The subject was structured to assist learners to develop interest in science and technology. The aim is that by the end of the junior secondary school, presently known as basic 9, science and technological appreciation would have been activated and sustained, and foundation laid for students' entrance into science and technology courses at senior secondary level of education as stated in the National Curriculum for Junior Secondary Schools 1998 (Obioma, 2007). Furthermore, the national curriculum maintains that, the subject of Basic Science and Technology which was then Basic Technology is to be offered in junior secondary schools so as to reduce widespread ignorance about science and technology, lay a firm foundation for national development and inspire an increase in skill acquisition. Basic Science and Technology is a subject that introduces students at the junior secondary level of education in Nigeria, to the fundamental and basic in science and technology.

In the light of the feedback on the implementation of the 9-Year basic education curriculum (BEC) received and the contemporary global and national concerns, the Nigerian government revised the 9- Year BEC in 2012 in line with global best practices as in Kenya -7 subject, Tanzania- 8 subject, United States of America -6 subject, Malaysia and Indonesia -9 subject offerings (Obioma, 2012). The curriculum revision process involved identification and grouping of related disciplines such as Basic science, Basic Technology, Physical and Health Education and Information Technology to create a new composite or cluster of Revised BEC subject called Basic Science and Technology . Key concepts in the former curricula now form integrating threads for organizing the contents of the new subject into a coherent whole.

The new BEC was developed in response to Nigeria's need for relevant, dynamic and globally competitive education that would ensure that learners at the Basic Education level are capable to compete favourably anywhere in the world in terms of knowledge, skills, techniques, values and aptitude. Thus the new 9-Year BEC addressed among other things, the issue of value re-orientation, poverty eradication, critical thinking, and entrepreneurship and life skills. Implementation of the new 9-Year BEC commenced nationwide, in Primary 1 and JSS 1 classes in September, 2008, while the old curriculum (the 6-3-3-4 Curriculum) was systematically being phased out. The first batch of JSS students graduated in June, 2011 after writing the Basic Education Certificate Examination (BECE). By September, 2014, the cohort of pupils that benefited from the use of BEC at the primary school level entered class one of the Junior Secondary School (Obioma, 2012).

The framework of the New Basic Education Curriculum according to Adeniyi (2012) reflects the following:

i. The curriculum is designed to properly target pupils and students' needs and interests to make provision for appropriate core and elective subjects for a well-rounded education at the different age levels
ii. The lower and Middle Basic Education Curricula (for primary 1-6) will be in full use by the year 2014 and the Upper Basic Education Curriculum (for JS 1-3) will be achieved by the year 2011
iii. Every child is expected to complete primary 6 before being placed in Junior Secondary (JS1)

The development of science and technology is also recognized worldwide as vital for a nations overall economic development. When used effectively science and technology is able to improve productivity and meet the needs of society. This has been demonstrated in the developed nations, and more recently in the newly industrialising nations, where science and technology have been responsible for more than half of the increase in productivity. The quest for technological advancement and industrial revolution therefore demands for a robust and inclusive science and technology curriculum at basic level of education. The curriculum should appeal to all learners and relevant to their need, regardless of backgrounds. Pupils are likely to learn better when they are interested in the subject and the subject is also relevant to their need, hence it becomes important to prepare curriculum that will be relevant and adequately cater for the need and interest of the pupils. There is evidence that using relevant context leads to a better understanding of the concepts involved compared to traditional teaching (Ramsden, 1997, Osborne & Collins, 2001) but a curriculum that uses content that is relevant and related to familiar and interesting phenomena and experiences in the local environment of the pupils may lead to a more meaningful learning (Nganunu, 1998).

In order to reduce ignorance in relation to science and technology and help lay a solid foundation for true national development, Basic Science and Technology has been accorded a place in the school curriculum as a core subject like English and Mathematics.

Damole (2011) stated that in the Nigerian education continuum, basic education as the foundation requires a sound knowledge of science and technology. This is not only because science and technology has a tremendous impact on all social institutions but because science teaching is "somewhat on the downside. The 9 years Basic Science and Technology Curriculum (BSTC) is therefore a restructuring and re-engineering of the revised core curriculum for Primary science and integrated science of Junior Secondary school currently in use.

In the selection of content for the new Basic Technology curriculum, Globalization, Information and communication Technology (ICT) and Entrepreneurship were the three major issues considered to be crucial in the development of a child, important to the nation, and influencing the contemporary world of knowledge. Thus in the aspiration for identification with contemporary development globally, it has become inevitable for Nigeria to incorporate relevant content into the school curriculum.

The new Basic Science and Technology (BST) curriculum now comprised of four subjects-basic science, basic technology, physical and health education and information technology. The objectives of the present BST curriculum are to reduce subjects overload and content repetition at Junior Secondary School (JSS) and also to adequately prepare students at JSS for SSS learnings and activities in science and technology subjects (Federal Ministry of Education, 2007). It is expected that this new curriculum will now serve as a preparatory (prerequisite) subject for science and technology subjects such as Physics, Chemistry, Biology, Agricultural Science, Health Education, computer related subjects, Technical Drawing, Basic Electronic, Metal Work,. Wood Work. Auto-Mechanic at SSS level. However, there are has been a lot of criticism on the effectiveness of the present basic education curriculum of which BST curriculum is included (Nwaubani & Azuh, 2014). Hence the need to assess the implementation of the new Basic Science and Technology curriculum to determine whether it is achieving the objective of introducing it.

Statement of the Problem

Basic Science and Technology in the junior secondary schools in Nigeria, is yet to reach its full potentials and engender full knowledge and vocational competences among Nigerian youths. This is because Basic Science and technology is confronted by myriads of problems such as which militate against its proper and efferent teaching in junior secondary schools. The experience of the researcher as a science and technology educators and interaction with other colleagues revealed that there has been a lot of criticisms in the field about this curriculum in terms of its implementation. This study therefore sought to assess the extent to which basic science and technology curriculum is being implemented in junior secondary school in Niger State and the problems inherent in the implementation of the already reformed curriculum.

Aim and Objectives of the Study

The aim of the study is to assess the implementation of basic science and technology curriculum in Junior Secondary Schools in Bosso and Chanchanga Local Government Area. The specific objectives are to;

1. Ascertain the teaching methods used by basic science and technology teachers in the implementation of the basic science and technology curriculum in Nigeria Junior Secondary Schools.
2. Identify the available instructional materials used in the implementation of basic science and technology curriculum in Nigeria Junior Secondary Schools.
3. Determine the adequacy of the available instructional material used in the implementation of the curriculum.

4. Identify the problems associated with the implementation of the basic science and technology curriculum in Nigeria Junior Secondary Schools.

Research Questions

The following are the guided research questions:

1. What are the teaching methods used by science and technology teachers in implementing Basic Science and Technology curriculum at Junior Secondary Schools?
2. What are the available instruction materials used for implementing Basic Science and Technology in Nigeria Junior Secondary Schools?
3. How adequate are the available instructional materials used for implementing Basic Science and Technology curriculum?
4. What are the problems associated with the implementation of the basic science and technology curriculum in Nigeria Secondary Schools?

Research Methodology

The descriptive survey design was adopted for the study. The design is appropriate since the study assessed the implementation of Basic Science and Technology curriculum in Junior Secondary Schools. The population comprised of Basic Science and Technology teachers and principals in Bosso and Chanchanga local government area of Niger state. The sample size used for the conduct of this study was 60 respondents, 15 principals and 45 Basic Science and Technology teachers from the two local government area used for the study. A random sampling technique was used in the study. Assessment of Basic Science and Technology Curriculum Implementation Questionnaire was used for data collection. The questionnaire was divided into two sections, sections A and B. Question in section A dwells on the bio-data of respondent and a guide on how to respond to the questionnaire items. While Section B consist of 33 items raised in the four research questions.

Items under the research question 1 and 4 are responded to using the following scale.

Strongly Agree (SA) = 4 points
Agree (A) = 3 points
Disagree (D) = 2 points
Strongly Disagree (SD) = 1 point

While items under research question 2 and 3 are responded to using the scale:
Available/Not Available and Adequate/Not Adequate respectively

The questionnaire used by researcher was validated by 3 lecturer in the Department of Industrial and Technology Education Federal University of Technology Minna for appropriate correction in order to produce the relevant information needed for answering the research questions. The validated questionnaire was used to collect data for this study. Cronbach's alpha reliability method was used to determine the internal consistency of the instrument for the data collection. The researcher pay a visit to the schools concerned to administered the questionnaire. The questionnaire administered to teachers and principals were duly returned, presenting 100% return rate.

The data collected was analysed using frequency count, statistical mean score method and Standard Deviation to agree or disagree on the respondents opinion on a particular item contained in the instrument. The mean score of each item was computed by multiplying the frequency of each response mode with appropriate nominal value and divided by the sum obtained under each item with the number of the respondents to an item. The means of 2.50 was used as decision point for every questionnaire items for research question 1 and 4.

Consequently any items with a mean response of 2.50 and above was considered to be agreed and any item with mean score of 2.49 and below was considered disagreed.

Results

Descriptive Analysis

The following descriptive statistics were presented to answer the research questions:

Research Question 1

What are the teaching methods used by science and technology teachers in implementing Basic Science and Technology curriculum at Junior Secondary Schools?

Table 1: The mean and standard deviation scores for the teaching methods used by by science and technology teachers in implementing Basic Science and Technology curriculum at Junior Secondary Schools.

S/N	Item	Mean	Standard Deviation	Remarks
1	Basic Science and Technology teachers often used cognitive development methods of teaching such as Discussion Method, Questioning/Socratic Method, Team Teaching Method, Talk Chalk/Recitation Method, Field Trip/Excursion Method and Team Teaching Method	2.20	.410	Disagree
2	Basic Science and Technology teachers often used Affective Development Method of teaching such as Modelling Method, Simulation Method, Dramatic Method, Simulation Games and Role-Playing Method	2.15	.489	Disagree
S/N	**Item**	**Mean**	**Standard Deviation**	**Remarks**
3	Basic Science and Technology teachers often used Psychomotor Development Methods of teaching such as Inquiry Method, Discovery Method, Process Approach Method, Demonstration Method, Laboratory/Experimentation Method, Programmed Learning Method, Dalton Plan/Assignment Method and Project Method	2.10	.718	Disagree
4	Basic Science and Technology teachers used traditional method of teaching such as lecturing, dictation, teacher led discussion and explanation.	2. 60	.616	Agree
5	Basic Science and Technology teachers used modern method of teaching such as problem – based learning, didactic games methods, brainstorming, heuristic method	2.25	.550	Disagree

Table 1 revealed that the respondents disagreed with all the items (2.10 to 2.25) except item 4 with the mean score 2.60. This showed that the mean value of each item was below the cut-off point of 2.50, indicating that all Basic Science and Technology teachers do not use cognitive developments method, affective development method, psychomotor development method, traditional method and modern method of teaching.

Research Question 2
What are the available instruction materials used for implementing Basic Science and Technology in Nigeria Junior Secondary Schools?

Table 2
Frequency and percentage of the available instruction materials used for implementing Basic Science and Technology in Nigeria secondary school.

S/N	ITEMS	FREQUENCY		PERCENTAGE (%)	
		Available	**Not Available**	**Available**	**Not Available**
1	Textbooks	60	0	100.00	0.00
2	Charts	44	16	73.33	26.67
3	Flat Pictures	38	22	63.33	36.67
4	Posters	45	15	75.00	25.00
5	Cartoon	12	48	20.00	80.00
6	Real Objects	47	13	78.33	21.67
7	Mock-up	0	60	0.00	100.00
8	Science and Technology Resource Centre	0	60	0.00	100.00
9	Chalkboard/Whiteboard	60	0	100.00	0.00
10	Flannel Board	3	57	5.00	95.00
11	Multimedia Projector	4	56	6.67	93.33
12	Computer Assisted Instruction	4	56	6.67	93.33
13	Internet	4	56	6.67	93.33

The data presented in Table 2 shows that majority of the respondents indicated that Textbooks, Charts, Flat-pictures, Posters, Real-Objects and Chalkboard/Whiteboard are available for implementing Basic Science and Technology in Nigeria secondary school.

Research Question 3
How adequate are the available instructional materials used for implementing Basic Science and Technology curriculum?

Table 3
Frequency and percentage of the adequacy of the available instruction materials used for implementing Basic Science and Technology in Nigeria secondary school.

S/N	ITEMS	FREQUENCY		PERCENTAGE (%)	
		Adequate	**Not Adequate**	**Adequate**	**Not Adequate**
1	Textbooks	55	5	91.67	8.33
2	Charts	26	34	43.33	56.67
3	Flat Pictures	0	60	0.00	100.00
4	Posters	18	42	30.00	70.00
5	Cartoon	1	59	1.67	

6	Real Objects	12	48	20.00	80.00
7	Mock-up	0	60	0.00	100.00
8	Science and Technology Resource Centre	0	60	0.00	100.00
9	Chalkboard/Whiteboard	60	0	100.00	0.00
10	Flannel Board	0	60	0.00	100.00
11	Multimedia Projector	0	60	0.00	100.00
12	Computer Assisted Instruction (CAI)	0	60	0.00	100.00
13	Internet	0	60	0.00	100.00

The data presented in Table 3 shows that only Textbooks and Chalkboard/Whiteboards are adequately available for implementing Basic Science and Technology curriculum while other materials such as real objects, mock-up, resource centre, CAI, charts etc. are not available for the implementation BST curriculum.

4.2.4 Research Question 4

What are the problems associated with the implementation of the basic science and technology curriculum in Nigeria Secondary Schools?

Table 4

The mean and standard deviation scores for the problems associated with the implementation of the Basic Science and Technology curriculum in Nigeria Secondary Schools.

S/N	Items	Mean	Standard Deviation	Remarks
1	There are no adequate instructional materials for proper implementation of Basic Science and Technology curriculum in my school.	2.90	.968	Agree
2	There is no teacher motivation in my school.	2.85	.671	Agree
3	There are no adequate classrooms for Basic Science and Technology lessons in my school.	2.60	.883	Agree
4	There are no adequate and up to-date Basic Science and Technology textbooks in my school.	1.95	.826	Disagree
5	There are no adequate funding for proper implementation of Basic Science and Technology curriculum.	3.10	.788	Agree
6	There are no adequate workshops and laboratories for Basic Science and Technology lessons in my school.	3.15	.587	Agree
7	Lack of technology tools and equipment affect the implementation of Basic Science and Technology curriculum .	3.25	.786	Agree
8	Insufficient power supply makes the operating of available Basic Science and Technology equipment difficult	3.25	.639	Agree

S/N	Items	Mean	Standard Deviation	Remarks
9	The use of resource person is not always considered in the implementation of Basic Science and Technology in junior secondary schools.	3.15	.587	Agree
10	Most of junior secondary school students are not interested in Basic Science and Technology lesson.	1.90	.641	Disagree
11	There are no qualified Basic Science and Technology teachers in my school.	1.50	.761	Disagree
12	Our community members have negative attitudes towards Basic Science and Technology education which also affect the implementation of Basic Science and Technology curriculum at Junior Secondary School	2.10	.447	Disagree
13	Basic Science and Technology teachers develop apathy to workshop practice due to lack of motivation.	2.50	.607	Agree

The data presented in Table 4 shows that up to-date Basic Science and Technology textbooks, students interest in Basic Science and Technology lesson, Basic Science and Technology teachers qualification, community members attitudes towards Basic Science and Technology education are not problems associated with the implementation of the basic science and technology curriculum in Junior Secondary Schools in Niger state while apathy to workshop practice due to lack of motivation, Insufficient power supply, adequate classrooms, no adequate funding, lack of technology tools and equipment and among others are the problems of implementing BST curriculum at Junior secondary schools in Niger State.

Discussion of Findings

The findings of this study on research question one revealed that Basic Science and Technology Teachers do not uses all the teaching method available to them especially modern methods in implementing the curriculum content of Basic Science and Technology. This is in line with the findings of Nwosu, & Ibe, (2012) and Albert, (1990) respectively, who found that the teachers place much emphasis on teaching method and the implementation of the course contents which is mostly dominated by the use of traditional techniques of instruction notably the lecture method to the detriment of other instructional strategies.

Finding number two and three indicated that majority of the schools junior secondary schools in the study areas lacked necessary instructional materials. It was further revealed that the instructional materials that are available are not adequate. This agreed with the Damole's view (1999) who opined that teaching and learning resources are challenges to curriculum implementation. There is limited procurement and supply of these resources in schools. Instructional materials and equipment are all in short supply or may not be available at all – no books or writing material, no science apparatus, inadequate or out of-date library.

The fourth finding revealed that, there are lots of problems identified with the implementation of Basic Science and Technology curriculum in Nigeria Secondary Schools. These problems includes; no adequate instructional materials, no teacher motivation, no adequate classrooms, no adequate funding, no adequate workshops and laboratories, lack of technology tools and equipment, insufficient power supply to operate the available Basic Science and Technology equipment, none usage of resource person in the implementation of Basic Science and Technology and Basic Science and Technology teachers develop apathy to workshop practice due to lack of motivation. These problems are significantly affecting the implementation of Basic Science and Technology curriculum. This tallied with the findings of Chukwuneke & Chikwenze (2012) and Eya & Elechi, (2011) who revealed that the problems of the implementation of Basic Science and Technology are lack of materials, facilities, current textbooks, equipped library and workshop. The authors further stressed that there is no adequate commitment on the part of the government to ensure that appropriate instructional resources and materials are provided for the implementation of the Basic Science and Technology curriculum.

Conclusion

The study assess the implementation of Basic Science and Technology in Junior Secondary Schools and the objectives set for this purpose is to determine the teaching methods used, availability and adequacy of instructional materials and the problems associated with the implementation of Basic Science and Technology curriculum.

The main findings of the study revealed that Basic Science and Technology teachers often used all the teaching methods available to them in the implementation of Basic Science and Technology curriculum, that Textbooks, Charts, Flat-pictures, Posters, Real-Objects, Chalkboard/Whiteboard, Cartoon, Flannel Board, Multimedia Projector, Computer Aided Instruction and Internet are available with the percentages ranging from 5% – 100% and Textbooks, Charts, Posters, Real-Objects, Chalkboard/Whiteboard and Cartoon are adequate with the percentages ranging from 1.67% - 100 %.

The findings further revealed some problems associated with the implementation of Basic Science and Technology curriculum in Nigeria secondary schools to include;

i. No adequate instructional materials.
ii. No teacher motivation.
iii. No adequate classrooms.
iv. No adequate funding.
v. No adequate workshops and laboratories.
vi. Lack of technology tools and equipment.
vii. Insufficient power supply to operate the available Basic Science and Technology equipment.
viii. None usage of resource person in the implementation of Basic Science and Technology.
ix. Basic Science and Technology teachers develop apathy to workshop practice due to lack of motivation.

Recommendations

Based on the research findings, the following recommendations were made to help in effective implementation of Basic Science and Technology curriculum in Nigeria:

1. All people concerned with the implementation of curriculum content to start from teachers, principals, parents, and supervisors should be actively involved and committed to ensure the effective implementation of Basic Science and Technology curriculum in Nigeria;

2. Basic Science and Technology teachers need to be conversant with the appropriate and innovative teaching methods and strategies and as well employing them while teaching Basic Science and Technology;
3. Basic Science and Technology instructional materials and resources should be made available to the schools, and Basic Science and Technology teachers also need to be knowledgeable on how to make use of these instructional materials and resources;
4. There is need to consider teacher motivation, and provide adequate classrooms for Basic Science and Technology lesson. The students and community members need to be interested and give active support to the teaching and learning of Basic Science and Technology as an educational programme.
5. Quality assurance officials should put more effort and perform their duties accordingly.

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IMPACT OF SCHOOL FACILITIES AND MAINTENANCE ON SCIENCE TEACHERS' JOB PERFORMANCE IN SENIOR SECONDARY SCHOOLS IN GWAGWALADA AREA COUNCIL ABUJA

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Abstract
The study investigated the impact of school facilities and maintenance on science teachers' job performance among senior secondary school in Gwagwalada area council of Abuja. The population of the study consisted of all the 133 science teachers teaching Biology, Physics and Chemistry in Gwagwalada Area Council in FCT Abuja. A sample of 93 science teachers were selected using purposive sampling technique considering school location, time and accessibility factors. Questionnaire on the impact of school facilities and maintenance on science teachers job performance (QUSFOSTEJOP) was used for the purpose of data collection. The instrument was validated by experts in science education and education supervisor in Gwagwalada Area Council whose inputs were used to adjust the items in the questionnaire. A reliability coefficient of .079 was obtained using Cronbach alpha (KR-20). Two research questions and One null hypothesis were answered in the study. The result indicated that there is a weak positive correlation between safety and security and school environment and job performance (rho = 0.270, P>0.05) of science teachers. It was thus recommended that, the area council should provide security and the enabling environment for science teachers to be effective in the discharge of their responsibility

Keywords: School facilities, Maintenance, safety and Security, Job performance

Background to the Study

The primary purpose of education is to bring about desirable change in behaviour through acquisition of skills, attitudes, competencies, critical and creative thinking. This cannot take place without adequate school facilities and secured environment for teaching and learning. Teaching is a complex and demanding task that requires highly specialized skills, knowledge and resources to impact significantly on student learning. The maintenance of resources in an organization are important in achievement of its goals and objectives. Students learning outcome is influenced by appropriate utilization of school resources. Investing in educational resources is the key to ensuring that schools become institutions where students work together, learn from each other and benefit from a supportive school environment, and consequently maximize student learning so that all students achieve their full learning potential (United Nations Scientific and Cultural Organization, (UNESCO), 2017).

Gradually, our public schools in Nigeria appears to lacking in school facilities which can attested to decline in teachers' productivity and students' performances in both internal and external examinations. School facilities in any school ranges from the school buildings, classroom, library, laboratories, and toilet facilities, learning materials to other infrastructures that would likely motivate teachers towards teaching and intricately improve students' academic performance. Experience has shown that most of the school facilities that are relevant to effective job performance of teachers and learning/academic performance of students appear not to be sufficient in our public secondary schools. Those available seem not to be of standard quality, some seem to lack maintenance culture, while some are in dilapidated conditions. In support of this, Afework and Asfaw (2014) submitted that school facilities enable the teacher to accomplish his or her task as well and aid the learner to learn and achieve effectively. In addition, the researcher emphasized that the availability and proper use (maintenance) of school facilities can affect the interest of the teacher to teach effectively in turn that positively affects student's academic achievement.

Science teachers who want to teach Science subjects and develop desirable attitudes, interest, appreciation, understanding, habits, abilities, knowledge and skills requires a stimulating environment. A stimulating school environment enables the teachers to teach a variety of activities with broad-base ideas about what the students are likely to learn or respond to. This makes it possible for both the teachers and the students to work cooperatively and productively towards attainment of educational goals. School environmental variables that affect teaching and learning include the following: Science and Computer laboratories, library facilities, adequate classroom facilities, workshop facilities and play grounds to mention but a few. Teachers and other personnel to manage and service the school facilities are the teaching, non-teaching and the administrative staff of the school. The availability of those resources and facilities in a given school environment influence the teaching, learning and the performance of both the teachers and the students (Nsa, *et al.*, 2012). Adeyemi (2008) submitted that performance is a measure of educational output. Academic performance can be viewed as the extent to which an individual learner acts or does a piece of work, how well or poor he/she does the job or the activities within a learning process. Poor performance however can be regarded as having performed below the required academic performance. Akomolafe and Adesua (2016), referred to poor performance as performance that fall below the desired standard.

Recent studies have emphasized the importance of the availability of physical school facilities. Summarizing Akomolafe and Adesua (2016) the researchers emphasized that the availability of these resources are quite important to achieving effectiveness in instructional delivery and supervision in the school system. The researchers further buttressed the fact that non-availability of basic facilities such as classrooms, office accommodation, workshops, sporting facilities, laboratories, library et cetera which is being experienced in secondary schools is a perfect reflection of what obtains in the university system.

In support of the above, Khan and Igbal (2012) posited that well sited school buildings with aesthetic conditions, laboratory and playground often contribute to improved performance in the school system. The researchers also argued that the availability of school building and other plant facilities are very important as they could enhance effective teaching and learning. Sampson (2011) is of the view that adequate facilities are essential for academic work. Also, in support of this Ones to and Bernard (2016) claimed that for effective teaching to take place in any educational setting there must be provision of adequate and quality school facilities.

These facilities play a pivotal role in the actualization of the educational goals and objectives by satisfying the physical, emotional and cognitive needs of the staff and students. Abayomi and Olukayode (2006) states that resources in schools are important in education because learning takes place best through discovery, exploration, and interaction with the internal and external environments. The adequacy of physical resources and teaching materials as well as their effective utilization has been a matter of serious concern to educators. The utilization of resources in education brings about fruitful learning outcomes since it stimulates and motivates students (Okorie, 2011). Furthermore, Ibe-Bassey (2002) agrees with this view and adds that several studies have shown that a close relationship exists between the physical environment and the academic performance of students. Reedy (2006) adds that the availability of physical facilities and the overall atmosphere in which learning takes place bears direct relevance to the quality of education that students receive in schools. In another study carried out by Okunamiri (2013) on the provision and utilization of school facilities in some selected secondary schools in Nigeria, his findings revealed that although facilities were adequately provided in some schools, they were not effectively utilized. He further emphasized on the need to ensure effective and efficient realization of the goals and objectives of the educational system. This implies that the availability of school facilities alone does not enhance teaching and learning; rather it is the adequate utilization of these facilities that can only motivate teachers to teach and enhance science teachers' job performance. Therefore, this study seeks to determine the extent to which school facilities and maintenance could influence science teachers job performance in Gwagwalada Area Council of FCT Abuja, Nigeria.

Aim and Objectives of the Study

The aim of this research is to determine the impact of school facilities and maintenance on science teachers job performance among senior secondary schools' in Gwagwalada Area Council of FCT, Abuja. Specifically, the study achieved the following objectives:

Research Questions

The following research questions guided the study:

1: Are the school facilities available to science teachers adequate for job performance in senior secondary schools in Gwagwalada Area Council, FCT, Abuja?

2: What is the safety and security measures put in place for maintenance of the school facilities in the senior secondary schools in Gwagwalada Area Council of Abuja?

Null Hypothesis

One null hypothesis was postulated and tested at 0.05 alpha level:

HO_1: There is no significant relationship between the school safety and security and environment on Science teachers' job performance in Gwagwalada Area Council of Abuja.

Research Methodology

The research design adopted for the study was a descriptive survey. The design was considered appropriate for generating the necessary information required for the study. The population consisted of all science teachers' teaching Physics, Chemistry and Biology in Gwagwalada Area Council senior secondary schools in Federal Capital Territory (FCT) Abuja. A sample size of ninety-three (93) science teachers were selected across the senior secondary schools using purposive sampling technique due to their spread (locations), time factor and accessibility. A questionnaire on the impact of school facilities and maintenance on science teachers' job performance was used in data collection. The items were Likert-scale types, a checklist and categorical response (YES/NO). the instrument was validated by experts in science education and senior inspectors of education in Gwagwalada Area Council who approved the items on the questionnaire. A reliability coefficient of 0.79 was obtained for the instrument using the Cronbach alpha (KR-20). The questionnaires were personality distributed by the researcher considering the locations of schools and identification of the responses which must be the science teaching disciplines. Questionnaire collected were carefully sorted and then analyzed using simply frequencies, Means (X), Standard Deviations and Spearman Rank-order (rho). In addition, descriptive charts (Bar & Pie) were used to further describe the analyzed data.

Results and Discussion

The data collected were analysed and presented as follows:

Research Questions 1: Are the school facilities available to teachers adequate for job performance in senior secondary schools in Gwagwalada Area Council, FCT, Abuja?

Table 1: Adequacy of items for the School Facilities

S/N	ITEMS	N	Mean $(\bar{X})$	SD	Decision
1	Library	93	1.76	0.427	AD
2	Science Laboratories	93	1.29	0.456	NAD
3	Teachers Offices	93	1.82	0.389	AD
4	Conveniences (Toilets)	93	1.31	0.466	NAD
5	Furnished Classrooms	93	1.06	0.247	NAD
6	Preparatory Room for Science Subjects	93	1.13	0.337	NAD
7	School Clinic	93	1.11	0.311	NAD
8	School Incinerator (for waste Disposal)	93	1.32	0.47	NAD
9	School Botanical Garden (Animal husbandry)	93	1.19	0.397	NAD
10	Water Tanks/Aquarium	93	1.62	0.487	AD
11	Electricity Supply/Generating Plant	93	1.29	0.456	NAD
	Grand Mean		**14.9**	**4.443**	NAD

Adequate (AD) and Not Adequate (NAD)

Table 4.1 shows the result of analysis adequacy of school facilities for science teachers job performance. The result indicates adequacy in the distribution of libraries, teacher offices and water in the schools with Mean (X) of 1.76, 1.82 and 1.62 respectively. There is however inadequate distribution of toilets, furnished classrooms, laboratory preparatory rooms, school clinic, waste disposal bins, botanical gardens and electricity supply. The grand Mean (X) indicates that, there is generally inadequate distribution of school facilities in Gwagwalada area Council in FCT Abuja.

Research Question 2: What is the safety and security measures put in place for maintenance of the school facilities in the senior secondary schools in Gwagwalada Area Council of Abuja?

Table 2: Analysis on safety and Security measures put in schools

S/N	Items	N	YES	(%)	NO	(%)
1	Are there Hidden Surveillance Cameras installed in school?	93	0.00	0.00	93	100

2	Does the School Administrator (Principal) carryout Constant Surveillance/ Monitoring of facilities?	93	51	53.7	42	46.2
3	Does your school have Security guards?	93	29	31.2	64	68.8
4	Is the school fenced in order to secure school property	93	39	41.9	54	58.1
5	Are there Fire Extinguishers and Sand buckets available in Laboratories?	93	12	12.9	81	87.1
6.	Do you have First Aid Boxes for emergency treatments?	93	79	84.9	14	15.1
	Grand		202	36.2	356	63.8

Table 2 shows that, even though there are several security measures in place in the secondary schools, there are no surveillance cameras with all the respondents (100%) confirming it. Fire extinguishers and sand buckets are also not available in schools (87%). However, there are first aid boxes for treatment of emergence health hazards in most of the schools (84.9%). Security guards and perimeter fence around the school to safeguard school property and students received a below average score of 31% and 42% respectively.

Analysis of Null Hypothesis

HO_1: There is no significant relationship between the school safety and security and environment on Science teachers' job performance in Gwagwalada Area Council of Abuja.

Table 3: Correlational Analysis between school safety and security and environment on Science teachers' job performance

Variables	Mean X	Standard Deviation SD	rho	p-value
School Safety & Security	10.53	0.775	0.270	0.799
School Environment	28.77	2.663		

Table 3 shows a Spearman Rank-Order (rho) analysis of relationship between school safety and security and environment on Science teachers' job performance in Gwagwalada Area Council of Abuja. The result indicated a correlation of rho = 0.270, P>0.05 which is a weak positive correlation. The hypothesis is thus not rejected which meant that, there is no significant relationship between school safety and environment on science teachers job performance in Gwagwalada are council of FCT Abuja.

Discussion of findings

The finding on adequacy of the school facility for science teachers job performance, the result indicates that science laboratories, toilets, furnished classroom, electricity supply/generating plant, water tank/Aquarium, incinerators are not adequate thus liable to affecting science teachers job performance. This result corroborate earlier study conducted by Okunloye (2013) claimed that, only few secondary schools have science laboratories to carry out scientific experiments in subject such as Chemistry, Biology and Physics. This is no far from the opinion of Mayama (2012) had identified overcrowded classrooms as one of the causes of poor school performance and examination malpractice while teaching and class management becomes very difficult. So, inadequate school facilities pose problem of class management for the teacher and even could lead to absenteeism amongst students.

The finding on the types of safety and security measures put in place in the secondary schools indicated that, there is completely no school with surveillance camera and fire extinguishers while sand buckets are not available in laboratories. There are no fence and security guards in the schools. This is confirming the view of Ani (2012) that government must ensure safety, security and maintenance in schools, and organize periodic workshops on safety and security issues for school administrators.

The null hypothesis on the relationship between safety and security and school environment on science teachers job performance revealed a positive but week correlation with rho = 0.270, P>0.05. The hypothesis was not rejected because even though there is correlation but very weak sufficiently not enough to say there is strong positive correlation between safety and environment towards enhancing science teachers job performance. In a study conducted by Opondo and Ajowi (2015) revealed that conditions of work influence work performance of support staff. The study also found that support staff in Rarieda Sub-County work under poor conditions. They experienced challenges such as inadequate working tools, low salary, inadequate housing and are overworked. In coping with the challenges faced, support staff carried tools from home, engaged in small scale businesses and odd jobs, commuted from their homes and others who are unable to cope persevered. This meant that, there is a strong correlation between working condition and task completion in any social setting at the school.

Conclusion

The study revealed that school facilities and maintenance with respect to security and school environment are key factors that have influenced science teachers towards job performance of teaching science in Gwagwalada area councils' schools in FCT, Abuja, Nigeria. Therefore, the study has revealed that, there is a correlation between school facilities and science teachers job performance which was a positive weak correlation.

Recommendations

From the findings of this study, the researcher wish to recommend the following:

1. That Gwagwalada Area Council should deliberately put measures in in place to provide libraries, toilets and other physical facilities in the schools.
2. Perimeter fence should be built around the schools to provide of lives and properties of the school. This becomes necessary now more than ever before due current insecurity faced in the country and Gwagwalada proximity to Abuja makes even more important
3. School environment should made more conducive for science teachers to perform their role of teaching optimally if good results are to be obtained by students.
4. The Area Council Education department should improve science teachers working conditions by taking up full payment of support staff salaries, increasing support staff salaries, putting up houses for support staff, recruiting more support staff to enable schools acquire enough working tools.

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IMPACT OF TECHNICAL EDUCATION CURRICULUM ON ENTREPRENEURIAL SKILLS OF COLLEGES OF EDUCATION GRADUATES IN NORTH-CENTRAL ZONE, NIGERIA

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Abstract
The study was conducted to establish the Impact of Technical education Curriculum on Entrepreneurial Skills of Colleges of Education Graduates in North-central Zone of Nigeria. The study was necessitated by the continuous decline of Colleges of Education Technical Education graduates' entrepreneurial skills which has resulted into escalating unemployment, social vices and economic hardship amongst others. The study had two objectives. Two research questions were generated to guide the study and two null hypotheses were formulated and tested at 0.05 level of significance. Survey research design was used in the study. The population of the study was one hundred and forty four (144), made up of sixty (60) Technical Education graduates (entrepreneurs) and eighty four (84) of their employees. The entire population was used in the study. Two sets of questionnaire were developed and used for data collection. The administration of the instrument took four weeks. One hundred and four (104) copies of the questionnaire were completed and returned. In answering the research questions, weighted mean of 2.5 and above was used as benchmark for agree while weighted mean of less than 2.5 represented disagree. Regression Analysis was used to test hypotheses 1 and 2, all at 0.05 level of significance. Null hypothesis one was rejected while Null hypotheses two, was retained. The study revealed among others that technical education curriculum has no significant impact on management skills of Colleges of Education graduates. Also, it was revealed that technical education curriculum has no significant impact on innovative skills of Colleges of Education graduates. Therefore, the researcher concluded that technical education curriculum has little impact on entrepreneurial skills of Colleges of Education graduates in North-central Zone of Nigeria. This action can result to lack of entrepreneurial skills by graduates of colleges of education to undertake a viable business venture for self-reliance which might result to increase in the level of unemployment, economic hardship and social vices amongst Technical Education graduates. In view of these findings, two recommendations were made among others that Technical Education curriculum should be strengthened by National Commission for Colleges of Education Technical Education curriculum planners to broaden its financial management skill components. Equally, technical education curriculum should be reviewed by NCCE technical education curriculum planners to ensure adequate incorporation of innovative skill components.

Keywords:- Technical Education, Entrepreneurial Skills, curriculum

Introduction
Entrepreneurship education is a course of study introduced to equip the recipients with the skills of how to utilize whatever utility skills that they acquired to take advantage of opportunities in an environment in order to become self-reliant. Technical education programme of Colleges of Education provides a study in entrepreneurship skill acquisition to prepare students of the programme for business entrepreneurship. According to Andrea (2010) entrepreneurial skills should consist of five basic skills which include: human resource management skills, financial management skills, innovative skills, customer skills and marketing management skills.

Technical education is the education meant for skill development and preparation of an individual for paid or self-employment. It is an aspect of technical and vocational education (TVET) whose purpose is to prepare a person(s) for employment in any occupation or groups of occupation (Uwaifor, 2009). According to International Labour Organisation (ILO ,2005), all technical and vocational training program are aimed towards acquisition of relevant knowledge practical skills and attitudes for employment in a particular trade or occupational area.

In Nigeria today, technical education is perceived as one of the solution to high unemployment rate due to its ability to create jobs for unemployed youth and enhancing sustainable national growth and development (Abdulrahman, 2013). This is because when individual acquire skill or capacity, they are empowered to shape their own lives and work situation pro-actively. One of such institution of learning which is concerned with the production of this pool of skilled craftsmen and enhancing national technological growth and human development is the technical college.

Entrepreneurship education aims at raising awareness of students about business skills, knowledge, promoting creativity, innovation and self-employment. This includes the acquisition of skills in areas that would be useful and make them self-reliant, and independent productive citizens of the society. Entrepreneurship is critical to the economic development of any nation. An entrepreneur is one who engages in business undertaking with an active and enterprising spirit. An entrepreneur is any person who coordinates the factors of production and bears the risk of uncertainty by investing scarce resources in business ventures. It is necessary for such an individual to acquire skills such as human resource management skills, marketing skills, customer service skills, financial management skills, creative/ innovative skills and risk management skills.

The focus of the study was to systematically investigate and document the impact of technical education curriculum on entrepreneurial skills of colleges of education graduates in the North-central Geo-political Zone of Nigeria. The assumption was that there was a positive impact, but where there are challenges and gaps, the study should provide a framework to address these gaps, and make the graduates of technical education in the North-central Zone more self-reliant and better job creators, thereby contributing to national development. North-central Geo-political Zone is one of the six Geo-political zones in Nigeria consisting of six states, namely Benue, Kogi, Kwara, Nassarawa, Niger and Plateau. The zone has three federal and nine state owned colleges of education offering technical education.

Statement of the Problem

Technical education is a programme of study that prepares individuals with multiple skills for teaching and entrepreneurship activities. Ali (2010) stated that dearth of employment related skills; entrepreneurial skills and ignorance of the work environment among youths have caused economic and personal hardship within the past few years. With so many graduates in the labour market, employers look for evidence of skills which would make an individual stand out from the crowd. In the last decade there had been growing economic downturn in the country leading to a situation of drop in the capacity of government and corporate organizations to provide employment to graduates of institutions of higher learning. This has been the case with graduates of technical education from colleges of education. The situation has led to a paradigm shift from relying on government jobs to the acquisition of entrepreneurial skills for self-reliance. Functional educational programmes, such as effective technical education, that is supposed to instill entrepreneurship and job skills for self-sustenance amongst the Colleges of Education graduates, may have not done much.

Experience of the researcher as a technical educationist for a decade, interaction with owners of business organizations have pointed to the possibility of Technical Education graduates of Colleges of Education not having desirable skills for starting, operating and managing their business enterprise. Many employers are known to have complained that NCE Technical Education graduates cannot communicate effectively, write correct letters or memo, provide leadership in the absence of the manager, take initiative, work without supervision, work as a team, keep simple financial records, operate simple office machine, keep proper filling system, cover meetings and take accurate minutes, in addition, they are not creative, not innovative, lack good customer relations, lack marketing skills, lack human resource management skills, lack financial management skills, lack skills to work under pressure and lack maintenance culture. Could these inadequacies be as a result of inadequate NCE technical education curriculum content to address these skills gaps? Could it be that the skills learnt in the classroom are different from what is obtainable in work place? Could it be as a result of lack of basic facilities for acquisition of these basic skills?

Based on the factors and issues emphasized above, there may exist skills gap in the curriculum of NCE Technical Education in Colleges of Education. Therefore, the focus of the researcher is to systematically investigate and document the impact of Technical Education curriculum on the acquisition of entrepreneurial skills of Colleges of Education students on their graduation to enable them cope with managing a successful business venture in order to be self- reliant in the face of unemployment and economic recession in Nigeria.

Purpose of the Study

1. Determine the impact of technical education curriculum on human resource management skills of graduates of Colleges of Education in North-central Zone of Nigeria.
2. Assess the impact of Technical Education curriculum on innovative skills of graduates of Colleges of Education.

Research Questions

The research work provided answers to the following questions:

1. What is the impact of Technical Education curriculum on human resource management skills of graduates of Colleges of Education in North-central Zone of Nigeria?
2. What is the impact of Technical Education curriculum on innovative skills of graduates of Colleges of Education in North-central Zone of Nigeria?

Hypotheses

In line with the research questions, the following null hypotheses were formulated for this study:

Ho_1: Technical education curriculum has no significant impact on human resource management skills of graduates of Colleges of Education in North-central Zone of Nigeria.

Ho_2: Technical education curriculum has no significant impact on innovative skills of graduates of Colleges of Education in North-Central Zone Nigeria.

Methodology

Descriptive survey research design was used for this study. The use of this design was recommended by Orah (2007), Udoh (2010) and Ibrahim (2011). They all stated that the design focuses on people, their beliefs, attitudes and behaviours, and it helps a researcher to systematically document current opinions and information. Therefore, it is an effective way to gather data through the use of questionnaire. This method enabled the researcher to describe an event, situation or phenomenon as it was at the time of study. The population of the study was one hundred and forty-four (144), made up of sixty (60) Colleges of Education Technical Education graduates operating their own businesses in North-central Zone of Nigeria and eighty four (84) employees of these businesses. The sample size of the study was one hundred and forty four (144), drawn from the entire population of the study. The population is considered manageable and therefore census sampling was used to adopt the entire population for the study. Two questionnaires were designed by the researcher as an instrument used in collecting data for this study. The first questionnaire was titled "Impact of Technical Education Curriculum on Entrepreneurial Skills of Graduates of Colleges of Education", the second was titled "Employee Assessment of Entrepreneurial Skills of College of Education Graduate Entrepreneurs". The first questionnaire (Impact of Technical education Curriculum on Entrepreneurship Skills of Graduates of Colleges of Education) was administered to the Colleges of Education graduates entrepreneurs, while the second questionnaire (Employees Assessment of Entrepreneurial Skills of Colleges of Education Graduate Entrepreneurs) was administered to the employees. The questionnaires were subjected to scrutiny and vetting by three experts in the Department of Vocational and Technical Education, Niger State College of Education, Minna.

A pilot study was conducted using fifteen technical education graduates operating their businesses in Kebbi State, and fifteen employees of these businesses. The choice of the location was based on the fact that Kebbi State is outside the study area. Secondly all Colleges of Education Technical Education graduates in Nigeria operated the same curriculum while in school. The researcher determined the reliability of the instrument using the data collected from the pilot study. Test re-test reliability test was carried out. The data obtained were subjected to statistical analyses in order to establish the reliability co- efficient of the instrument. A standardize Cronbarh alpa reliability co-efficient of 0.72 was obtained. This value was considered reliable according to Uzosike (2008) who stated that reliability coefficient obtained at the average value of co-efficient of 0.70, is reliable and internally consistent and valid for the study. The researcher administered the instruments to the respondents with the help of 3 research assistants. The administration of the instruments took four weeks. The respondents were requested to fill the questionnaire on the same day they were given. This was to avoid loss of instruments and possible extraneous impacts in filling the questionnaire. The two research questions were answered using mean and Standard Deviation. In the course of answering research questions, Strongly Agree and Agree were classified as Agree, similarly, Strongly Disagree and Disagree were classified as Disagree. A Mean of 2.5 and above was considered agree; while a mean of less than 2.5 was considered as disagree. Regression analysis was used to test null hypotheses 1 and 2. In the analysis, where r-calculated value was greater than r-critical, the null hypothesis was rejected. On the other hand where the r-calculated was equal to or less than the r-critical, the null hypothesis was retained. All the null hypotheses were tested at 0.05 or 5% level of significance.

Results

Research Questions One: What is the impact of Technical Education curriculum on human resource management skills of graduates of Colleges of Education in North-central Zone of Nigeria?

Table 1. presented the result of data used to determine the impact of technical education curriculum on human resource management skills of graduates of colleges of education.

Table 1 Mean Score of the responses of Technical Education Graduates (Entrepreneurs) on Impact of Technical Education Curriculum on Human Resource Management Skills of Graduates of Colleges of Education in North-central Zone of Nigeria

Item	Total Agree	Total Disagree	Mean ($\bar{x}$)	STD	Overall Mean
Curriculum of NCE technical education provided me with interpersonal skills to relate with others and resolve conflicts in my organization	116	30	2.8	1.155	
Curriculum of NCE technical education developed my skill of team work to effectively manage my staff.	114	27	2.7	1.108	
Leadership skills acquired through technical education programme helped me to efficiently manage my staff.	107	35	2.7	1.012	
Communication skills acquired through NCE technical education curriculum helped me to effectively discuss, explain issues and resolve conflicts for the growth of my business.	108	32	2.6	1.001	2.7
NCE technical education curriculum developed my self- regulating skills to control my feelings when dealing with staff and others for the success of my business.	85	47	2.5	0.959	
NCE technical education curriculum provided graduates with skills to understand weakness and strength of others for effective personnel management	131	24	3.0	0.918	
NCE technical curriculum provided me with skills to be able to motivate others at work.	131	21	2.9	0.904	
NCE technical education curriculum provided me with empathy skills to be able to consider employees feelings when taking decision.	104	38	2.7	0.888	
NCE technical education curriculum provided me with Social skills to be	94	40	2.6	0.977	

friendly with my staff and others.				
NCE technical education curriculum equipped me with skill of recruitment, selection, evaluation, promotion/ remuneration of staff.	80	42	2.3	0.045

From Table 1, the summary of the result showed overall mean of 2.7 representing the opinions of the respondents who agreed that technical education curriculum impacted the human resource management skills of graduates of colleges of education. The respondents who disagreed had a mean of 2.3. Item 6 which stated that technical education provided graduates with skills to understand the weaknesses and strengths of others had the highest mean of 3, followed by item 7 with mean of 2.9 while item 10 had the lowest mean of 2.3. From the analysis, the calculated value of overall mean was 2.7 > 2.5 index, score. This implied that technical education curriculum impacted human resource management skills of graduates of colleges of education in North-central Zone of Nigeria.

Research Question Two: What is the impact of Technical Education curriculum on innovative skills of graduates of Colleges of Education in North-central Nigeria?

Table 2 presented the result of data used to determine the impact of Technical Education curriculum on innovative skills of graduates of Colleges of Education.

Table 2 Mean Score of the responses of Technical Education Graduates (Entrepreneurs) on Impact of Technical Education Curriculum on Innovative Skills of Graduates of Colleges of Education

S/N	Item	Total Agree	Total Disagree	Mean ($\bar{x}$)	STD	Overall Mean
1	NCE technical education curriculum provided me with entrepreneurial skills to identify a need that can be satisfied with a service	70	30	2.2	1.131	
2	NCE technical education curriculum provided me with fundamental entrepreneurial skills of building a solid and viable business plan.	40	27	1.9	0.926	
3	NCE technical education curriculum provided me skills to identify a venture's strengths and weaknesses and be able to set up clear timetables with contingencies for handling the problems.	57	35	2.1	0.991	
4	NCE technical education curriculum provided me with entrepreneurial skills to analyze trends in the economy and take appropriate business decision.	85	32	2.1	1.056	
5	NCE technical education curriculum	72	47	2.3	0.988	2.2

	provided me with entrepreneurial skills of critical and creative thinking to solve problems and be successful in business venture,				
6	NCE technical education curriculum provided me with entrepreneurial skills to make decisions based on relevant information.	59	24	2.2	1.043
7	NCE technical education curriculum provided me with entrepreneurial skills to negotiate business deals effectively.	50	21	1.9	1.009
8	NCE technical education curriculum provided me with skills to be committed to a good course	66	38	2.4	0.934
9	NCE technical education curriculum provided me with entrepreneurial skills to organize and administer a successful business enterprise.	64	40	2.3	1.082
10	NCE technical education curriculum provided me with entrepreneurial skills to initiate profitable business understanding.	67	42	2.2	1.061
11	NCE technical education curriculum provided me with entrepreneurial skills to plan and prepare to minimize cost and maximize profit for success of my organization.	100	40	2.7	0.981

From Table 2, the summary of the result showed overall mean of 2.2 representing the opinions of the respondents who agreed that technical education curriculum impactd the innovative skills of graduates of colleges of education. The respondents who had contrary views had a mean of 1.8. Item 11 had the highest mean of 2.7 followed by item 8 with mean of 2.4 while items 2 and 7 had the lowest mean of 1.9. The calculated overall mean was 2.2<2.5 index score. This implied that technical education curriculum had no impact on innovative skills of graduates of colleges of education.

Test of Null Hypotheses

This section presented analysis of data used to test the Null Hypotheses..

Null Hypothesis One: Technical education curriculum has no significant impact on human resource management skills of graduates of Colleges of Education in North-central Zone of Nigeria.

Table 3 presented the result of Regression analysis used to determine impact of Technical E7ducation curriculum on human resource management skills of graduate of Colleges of Education.

Table 3: Regression Analysis of Respondents' Opinion on the Impact of Technical education Curriculum on Human Resource Management Skills of Graduates of Colleges of Education in North-central Zone of Nigeria

Model	B	Mean	STD.	Std error	r-crit	r-cal	R^2	Adjusted R^2	p-value
TEC	1.531	2.7	1.01	.044	0.088	.774	.599	.592	0.000
HRM skills	1.111	1.3	.922	.124					

Source: Field Survey, 2016

HRM Skills = Human Resource Management Skills,
TEC = Technical Education Curriculum
From Table 3, the observed value of r value of (r=0.774) was significant. The summary from the regression analysis Beta, the constant had a value of 1.531 against the coefficient value of 1.111 for human resource management skills. The calculated r- value was .774 found greater than table value of 0.088 (p-value= 0.000) at 0.005 level of significance. The R^2 was 0.599 indicating that 60% of the variability of Human Resource Management Skill of graduate of Colleges of Education was impactd by Technical Education curriculum. The analysis showed that Technical Education curriculum had significant impact on human resource management skills of graduates. Therefore, the null hypothesis was rejected.

Null Hypothesis Two: Technical education curriculum has no significant impact on innovative skill of graduates of Colleges of Education in North-central Zone of Nigeria

Table 4 presented Regression analysis used to determine impact of independent variable on dependent variable in the null hypothesis three.

Table 4 Regression Analysis of Respondents' Opinion on Impact of Technical Education Curriculum on Innovative Skills of Graduates of Colleges of Education

Model	B	Mean	STD.	Std error	r-crit	R2	Adjusted R^2	r-cal	pvalue
TEC	1.531	2.2	1.03	.043	0.088	0.006	0.004	.080	.189
Innovative skills	.425	1.8	1.01	.139					

Source: Field Survey, 2016

TEC = Technical Education Curriculum,
From Table 4, calculated r-value 0.080 was less than r- critical value of 0.088 at 0.05 levels of significance. The observed value (r-0.080) is not significant. The value of Beta, the constant is 1.531 against the co-efficient value of 0.425 for innovative skills. The calculated r- value of .080 was less than the table value of 0.088 (p-value = 0.189) at 0.005 level of significance. The r^2 value was 0.006 indicating that only 0.6% of the variance in innovative skills of graduate of colleges of education was impactd by Technical Education curriculum. The analysis showed that Technical Education curriculum had no significant impact on innovative skills of graduates of Colleges of ducation. Therefore, the null hypothesis was retained.

Discussion of Results

Technical Education curriculum had significant impact on human resource management skills of graduates of colleges of education in North -central Geo-political Zone of Nigeria. The study discovered that interpersonal skills of Technical Education graduates to relate with others to run their businesses smoothly was positively impacted by technical education curriculum. It is agreed by both the graduate entrepreneurs and their employees that Technical Education curriculum had positive impact on human resource management skills of graduates of Colleges of Education as revealed in Table 1 with 2.7 means, Table 1 with mean of 2.5. The findings of this study agreed with Ediagbonya and Oyadongha (2013) Ibrahim (2014) who opined that technical education curriculum had potentials to positively impact knowledge, skills, attitudes, values for gainful employment.

The results of tables 2 and 4 show that Technical Education curriculum had no significant impact on the innovative skills of graduates of Colleges of Education. This implies that Technical Education curriculum had provided graduates with skills needed to successfully initiate for startup. This finding falls short of the expectations of Adeshina (2013) who expected Technical Education students to be prepared with entrepreneurship skills that will make him/her to provide jobs instead of seeking for a job after completion of the programme. Equally the finding was contrary to Iheanacho (2011) who asserted that a potential entrepreneur should be trained to sharpen his creative and innovative skills to identify a need that can be satisfied with a product or service through Technical Education programme.

Conclusion

On the basis of the findings, Technical Education curriculum had little impact on entrepreneurial skills of graduates of Colleges of Education, therefore, it was concluded that since this is the case, the situation can result to lack of entrepreneurial skills by graduates of Colleges of Education to enable them undertake a viable business venture to be self-reliant. This might result to increase level of unemployment, economic hardship and social vices amongst Technical Education graduates. Also, this trend might slow down the economic growth of Nigeria because important segments of her population are not adequately prepared with adequate skills for entrepreneurship activities.

Recommendations

The following recommendations were made;

1. The human resource management skill component of the technical education curriculum should be retained by NCCE Technical Education curriculum planners because it had positive impact on the graduates' human resource management skills.
2. Technical education curriculum should be reviewed by NCCE Technical Education curriculum planners to ensure adequate incorporation of innovative skill components.

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INCLUSIOIN OF ROBOTIC WELDING CONTENTS INTO METAL-WORK TECHNOLOGY EDUCATION PROGRAMME IN THE NIGERIA CERTIFICATE IN EDUCATION CURRICULUM.

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Abstract
As the world technology is fast changing towards digitalization and automation in every sector of the economy with the use of robots, the current trend is that Robotic welding becoming more popular in this 21st century. Economically developed countries in the world such as the United States of America, Germany, France, United Kingdom, Russia, China, and Japan, among others have robotic welding operations in the curriculum of their schools and colleges. This is needed in Nigerian schools and colleges as well to bridge the gap with the developed world. The Minimum standards for Nigeria certificate in education structured by the Federal Republic of Nigeria's National Commission for Colleges of Education, shows clearly that Robotic welding is missing in the curriculum for Metalwork Technology Education Programme. This study focuses on the need to include robotic welding into Metal-work Technology Programme in the Nigeria Certificate in Education Technical Curriculum, an overview of robotic welding, rate of usage of robots and robotic welding across the globe, benefits of robotic welding and robots market forecast for 2019 – 2021. In conclusion, the paper recommends among others that, all agencies and stakeholders responsible in curriculum development should always consider the current needs of the society and do away with stereotype curriculum that will benefit the oncoming generations.

Keywords: Robot, Robotic welding, Curriculum, Metalwork-Technology.

Introduction

Gone are those days when human beings were used to legs, animals, and cart to move from one place to another as a means of transportation. In today's world, man does not only invent and use aeroplane but also made history through technology when men are now carrying pregnancy and giving birth. With the trend of technology evolving around human lives, after the invention of hand tools, electricity and machines for the basic needs of the society, technology and innovation are becoming inseparable and making waves in shaping the future of man and the society from engineering, transportation, healthcare, manufacturing, business, to law and communication.

In today's world, the advent of technology has given birth to a robot which is called, 'artificial human intelligence' and as a matter of fact, manufacturing industries are making waves too in the use and need of skills on the usage, repair and invention of robotic welding as the world is tailoring towards this technological path. It is no longer news that Nigerian youths are making waves in terms of robot competition across the globe from the secondary school levels (Nigeria robots driving in Africa technology hub; Sep 24, 2018). Unfortunately, there is no robot/robotic welding programme offered at the Nigeria Certificate in Education (NCE) level neither is it included in the curriculum, where the training of manpower in the area of technology among others is required. One of the goals/objectives of Technical / Teacher Education is to provide trained manpower in applied sciences, technology and business particularly at craft, advance craft and technical levels and also, provide qualified Technical Teachers motivated to start the so much desired revolution of technological development (FGN/ NCCE, 2012; FRN/NPE, (2013). If this applies to students at the NCE level where Metalwork Technology course is been offered, an urgent need for the inclusion of Robotic Welding into the curriculum to have more youths acquainted with the 21st century must be addressed.

An Overview of Robotic welding

A robot is a computerized controlled system which allows the use of computer and computer software to supervise the operation of a control system. These operations can be easily and cheaply changed by making software modifications, without making any complicated modifications to circuitry or apparatus. Robots have the capacity through a set of programmes that control the automatic actions of machines which involves sensor motor, emotional, social and cognitive intelligence. The process of involving machines to perform a faster task than human beings as a result of the latest trend in technology warranted the invention and usage of robots. Robots as asserted by Aririguzo, and Agbaraji (2016) has the potential to improve the productivity of manufacturing as it performs tasks traditionally conducted by humans especially in the area of welding and fabrication from improved flexibility

Welding is widely used in industry as a joining technique both for fabrication in production and for repairs. It has almost completely replaced riveting and assembling the structural steel members of bridges and buildings in joints where permanent solutions are required. As asserted by Kah, et al; (2015), robotic arc welding was first used in production in the mid-1970s and later join in the leagues of welding processes because as a reprogrammable and multifunctional manipulator, it is designed for the performance of a variety of tasks for moving tools, parts, materials, or specialized devices, to variable programmed motions. In this current technological era, robotic welding has become a modern welding technology.

The world technology is fast changing towards digitalization and automation in every sector of the economy with the use of robots. The manufacturing industry where welding is used to assemble parts by automated robotic weld is not left behind which is believed to increase productivity and greater output of efficiency. According to Farkas (2018), manufacturing industries have widely adopted the used of automation in welding to improve welding process efficiency, increase productivity, enhance welding quality, and reduce scraps and other harmful agents inform of ultra-violet light exposure, welder's flash, and toxic fumes. As a result of the advantageous side of robotic welding over the manual welding, many welding industries across the globe have realized the potential increase of using a robot to weld giving a quality weld with little or no hazards compare to the manual weld. With this development, the use of robotic welding is fast driving industrial welding robots market growth as the demand keeps increasing (Farkas, 2018).

Usage of Robotic Welding

The concepts of using robots have been predicted in many ways it assists in the manufacturing and assembly industries where welding of various components are involved. Due to the involvement of heat intensity, rays from the arc, complex and intricate shapes, the accuracy of welding beads, deposition and penetration level, distortion and residual stress, and physical contact with human operators in manual welding operations, robotic welding is now becoming more and most preferred. Robotic welding is highly consistent with the ability to produce high quality and consistent correct speed, the distance of electrode travel, weld beads and welding angle (Erin 2017; Gnanavelbabu, et.al. 2017).

Table 1. Statistical data of the rate of usage robots in the world

Items	Years	Units	Sales Value
Professional service robots	2017	109,543	US$ 6.6bn.
	2016	59,269	
Public relation robots (telepresence, mobile guidance and information).	2017	10,043	US$ 177m
	2016	6,388	
Mobile barn cleaners or robotic fencers for automated grazing control.	2017	6,375	
Field robots.	2017		US$ 966m
Service robots for personal.	2017	8.5 million	US$ 2.1bn
	2016	31%	
Household robots.	2017		US$ 1.6bn
	2016	30%.	
Entertainment robots	2017	2.4 million	US$ 0.44bn
	2016	12%	
Handicap assistance robots	2017	6,423	
	2016	5,313	

Source: World Robotics Service Robots (2018).

Table 2 Projections 2018 and 2019-2021 professional service robots

Items	Years	Units	Sales Value
Professional service robots	2018	165,000 (32%)	US$ 8.7bn.
	2019 to 2021	736,600	
Compound Annual Growth Rate expects	2019 and 2021		US$ 37bn.
Sales of logistic systems	2018	115,000	US$ 3.9bn.
	2019 to 2021	485,000	
automated guided vehicles		189,000	

Source: World Robotics Service Robots (2018).

Table 3 Projections 2018 and 2019-2021 personal/domestic service robots

Items	Years	Units	Sales Value
Robots for domestic	2018	7.5 million	US$ 2bn
	2019-2021	39.5 million	US$ 11.1bn.
Professional service robots	2017	109,500	
	2018	165,300	
	2019-2021	736,000	
Service robots for domestic/ household tasks:	2017	6.1 million	
	2018	7.5 million	
	2019-2021	39.5 million	
Service robots for entertainment:	2017	2.4 million	
	2018	2.8 million	
	2019-2021	10.7 million	

Source: World Robotics Service Robots (2018).

Robotic Welding Market Forecast for 2019 to 2024

- North America (the USA, Canada and Mexico)
- Europe (Germany, France, UK, Russia and Italy)
- Asia-Pacific (China, Japan, Korea, India and Southeast Asia)
- South America (Brazil, Argentina, Columbia etc.)
- The Middle East and Africa (Saudi Arabia, UAE, Egypt, Nigeria and South Africa)

Source: (Global Welding Robot Market Analysis, 2019).

There is a clear indication that the countries that will patronize the use of robotic welding in the world are the USA, Canada, and Mexico on top while the least is Nigeria and South Africa. This means that Nigeria will have to do more in introducing Robots into her educational curriculum especially at the NCE level.

Nigerian Youths and the use of Robot

Nigerian youths have begun to aspire further in the field of Robot and its innovation in the last four and a half decades. This is because of their familiarity and usage of robots in their various schools and colleges. Many of these youths are making waves and winning various categories of awards in robot invention and its applications. Below is the list of some talented Nigerian youths with what they have done in the field of a robot. These are just a few brilliant Nigerian youths among others and so, there is the need for the country to include Robotic Welding into her educational curriculum in schools and colleges to have more youths acquainted with the 21st-century robot skills needed on how to use it, repair and invent other robots.

1. Fathia Abdullahi, a 12-year-old Nigerian girl, created a laundry-folding robot that folds clothes in three seconds (Reuters, 2019).

2. Oluwatobiloba Owolola, who is also 12, programmed a robot grabber that senses nearby objects and moves them to a more desired location (BBC News Africa, 2019).

3. Silas Adekunle is a 26-year-old Nigerian engineer who created the world's first gaming robot using AR technology (Nigeria robots driving in Africa technology hub; Sep 24, 2018).

4. Ten (10) Nigeria start-ups featured at the GITEX start-up in Japan Sony's Robot Dogs Tech on Nov 4, 2017.

5. A 24-yr old African Nigerian software Engineer builds Artificial Intelligence robot at Sri Lanka on Dec 29, 2016 6. Oreoluwa Alaba participated and won a gold medal at the junior explorer category at the World Robot Olympiad 2017 (World Robot Olympiad 2017. 7. Folarin Omobolanle a Senior Secondary School III student from New Era Girls Senior Secondary School, Shitta, Surulere, Idris Olawale an SS II student from Lagos State Model Senior College Meiran, and Kehinde Arapaja, Busayo Agoro, and Feranmi Ogunbandejo from Concord School, Mobil, Ibadan

The Nigeria Certificate in Education (NCE) Technical Programmes

The Nigeria Certificate in Education (NCE) Technical is rested upon its philosophy of providing the intellectual and professional bedrock for teaching technical subjects in any changing situation in technological development in the world at large (Federal Republic of Nigeria 2012). One of the objectives of the programme is, “to provide qualified Technical Teachers motivated to start the so much desired revolution of technological development right from the Nigerian Schools”, collaborating the goal of Technical Education.

The Goals of Technical Education

The Federal Republic of Nigeria in the National Policy of Education (FRN 2013) defines technical education as "that aspect of education, which leads to the acquisition of practical and applied skills as well as basic scientific knowledge". The mindset is that the individual is trained to be self-reliant, and well produced. This led to the formulations of the following goals of technical education in Nigeria. According to the FRN (2013), one of the goals of Technical Vocational Education and Training is to provide trained manpower in applied sciences, technology and business particularly at the craft, advance craft and technical levels. The students of this programme are equally trained to be self-employed or pick a job in the industry as this depends on their choice. In the event of this, many computer software aids can be used in this regards such as the Solid works, and Robots to programme robotic welding skills which can be imparted into the trainees of the programmes.

Robotic welding could be included in the Metal-work technology curriculum for effective actualization of the goals set out for the country’s technological development. Some of the Metal-work technology courses offered at NCE Technical levels is Sheet Metalwork fabrication and Welding, Foundry and Forging, Machine Shop Practice, and Advance fabrication and Welding (Federal Republic of Nigeria 2012). Sheet metal, fabrication, and advanced welding is already included as an introductory aspect of gas and arc welding in the area of soft soldering, brazing, and bronze welding. With this provision, the scope can be expanded to include robotic welding process that could be applied the following types of welding; Arc, Resistance, Spot, TIG, MAG, Laser, and Plasma.

Benefits of Robotic Welding

The benefits of robotic welding outweigh manual welding considering the safety and production benefits. Some of these benefits are that;

i. It produces higher quality parts to be produced and drives down labour costs of manual welders.
ii. It reduces the operator‘s exposure to hazardous bio-products of the welding process.
iii. The welding process is more efficient as it allows for continuous welding and reduces time when welding does not occur (automated system).
iv. It reduces the amount of gas and electrode consumption and eliminates electric shock.
v. It eliminates the operator’s act of inhaling toxic fumes and gases like manganese which is harmful and can damage the brain and nervous system.
vi. It reduces welder’s flash (corneal burn) caused by ultraviolet light exposure which can permanently damage the eye’s cornea.
vii. It prevents reaction of solvents containing chlorinated hydrocarbons and ultraviolet light which may result in the formation of phosgene gas, which is deadly even in small quantities.
viii. It prevents respiratory problems as breathing in iron oxide irritates nasal passages, throat, and lungs.

Source: (Erin, 2019; The Drake Group, 2017, Gnanavelbabu, et.al; 2017)

Conclusion

The fact remains that the world is changing as a result of innovations in technology, so the educational system must be tailored towards the new changes by constantly reforming various educational curriculum programmes to accommodate the necessary skills. Since Technical / Teacher Education is to provide trained manpower in applied sciences, technology and business particularly at craft, advance craft and technical levels and also, provide qualified Technical Teachers motivated to start the so much desired revolution of technological development as its utmost goal, the curriculum for Metalwork Technology should include robotic welding operations so that youths and other beneficiaries of the programme can fit into the current needs for the 21st century skills.

Recommendations

Based on the many benefits of robotic welding in this 21st century, the following recommendations were made:

1. All Specify the agencies and stakeholders responsible in curriculum development should always consider the current trend in the world and the need of the society to be guided curriculum planning.
2. Schools and Colleges should always expose their staff and students to robotic training/ workshops to enhance their skills and performances.
3. Lecturers should be provided with the software and other robotic simulation for installation to arouse their interest and boost their psychomotor skills.
4. Robotic welding should go in line with the robotic game so that students will not be bored when practical work is been carried out.
5. The number of practical hours assigned in the curriculum should outweigh the duration for classroom theories for the training to more practical oriented.
6. The sheet metal fabrication and advanced welding that are already in the curriculum of Metalwork Technology programme be integrated with robotic welding procedures and operations.
7. Government and other relevant agencies should partner with manufacturers of world-class robotic welding technology on the supplies of training tools and equipment for the robotics programme just as it is been done in developed countries.

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CURRICULAR IMPLICATIONS OF TEACHING SCIENCE MATHEMATICS AND TECHNOLOGY EDUCATION IN MOTHER TONGUE IN NIGERIA'S SCHOOL SYSTEM

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Abstract
A recurrent challenge in the enhancement of quality education in Nigeria is the choice of language of instruction. Whereas many preferred teaching in Mother-tongue medium, others consider the international lingua franca – English language as the best medium for teaching any subject to any student. The role of Mother Tongue as the language of instruction at least at lower level of education was clearly stated in the National Policy on Education. However, implementing this policy has faced various challenges in Nigeria. This paper discusses this issue of Mother Tongue and its curricular implications in teaching Science, Mathematics and Technology education in Nigerian Schools. Although UNESCO declared in 1958 that it is axiomatic that the best medium for teaching a child is his mother tongue, African countries have not invested enough in ensuring that languages of their communities are used as medium of instruction in Science and Technology Education. The position of this paper is that concerted efforts have to be made to ensure learners in Nigeria are encouraged to use their mother tongue or language of their immediate community in their education. The paper, therefore advocates that regions or states in Nigeria should develop their policy on education and a curriculum that takes cognizance of Mother tongue language of Instruction using any language of its choice at all levels of its education to leapfrog development in Science Mathematics and Technology Education.

Introduction

Instruction in the language which is not the primary language of students can be great hinderance to cognition especially of Science Mathematics and Technology Education. Proficiency in communication is key to meaningful learning. Language of communication plays a leading role in teaching and learning processes and could be a barrier to effective communication in developing critical thinking minds in Science Technology and Mathematics Education which is a factor militating the development of Nigeria in particular and Africa. The role of language as a medium of instruction in promoting an effective teaching and learning is an issue that has occupied many scholars all over the world for many years (Lartec, Belisario & Bendanillo, 2014). English is the language of instruction (official language) in schools and governments official transactions instead of indigenous language which has been found to be the most efficient ways of challenging educational disadvantages in Nigeria in particular and Africa in general (Wolff, 2010; George, 2011).

NEED FOR OPTIMAL USE OF INDIGENOUS LANGUAGE FOR CLASSROOM INSTRUCTION

Although there is a prevalent view that language of instruction is a complex issue, the need to revolutionise the current medium of instruction and optimal use of indigenous language for classroom instruction is a necessary tool for national development. There has been a number of pilot projects conducted on use of indigenous languages for classroom instruction in many African countries including Nigeria. Wushishi (2010) stated that the realization of the importance of Mother tongue medium of instruction in education has a long history. Mondez (2013) stated that in Iloilo Philippines as early as 1948-1954, an experiment was conducted to compare students' performance taught in Hiligaynon and those taught in English. The result of the study showed that Hiligaynon students outperformed those who were taught in English in Mathematics. Notwithstanding arguments for or against the use of Mother-Tongue, Uchenna, (2012) observed that results of several educators showed that mother-tongue-based bilingual offers significant pedagogical advantages to the students and also enriches classroom discussion.

In Nigeria, results of research findings by Fafunwa (1975); Adler (1998), Setati and Adler (2001), Nicol, (2005), Usman and Umo, (2006), Charanci (2011), Wushishi, Yusha'u and Hassan (2013), as well as Usman, Wushishi, Gambari, and Olayinka (2018), all favoured the use of mother tongue. At a UNESCO conference on cultural diversity in 2001, the use of mother-tongue to enhance learning among children was re-emphasized, especially where there are communication problems. The Federal Republic National Policy in Education recognised teaching using the mother tongue (FRN, 2004) at least at lower basic level in Nigeria. However despite the policy provision which is aimed at improving the quality of the education system, the investment in adopting the use of MT as the medium of instruction has not been encouraging and most states are not implementing the policy (Ohiri-Aniche, 2002). Researchers such as Ezeugwu and Igbo, (2013) asserted that Nigeria needs to review its inherited system of education from the colonial administration that had some defects in terms of contents and philosophy with respect to the needs of the country. This could include making provision for states to develop separate policy on education in line with the National policy that takes cognisance of the state's peculiarities and language used for classroom instruction.

In a study by Awoyemi (2012) on importance of language proficiency in the learning of Science, echnology and Mathematics (STM) in Nigerian schools, the researcher found from their study that there was a significant positive correlation between Yoruba Language and each of the six STM subjects. Similarly, in another study using quasi-experimental research design Patrick and Theresa (2015) the effect of Igbo Languages as the medium of instruction on the enhancement of retention level of Primary 3 Pupils in Primary School Mathematics in Delta State (DS), Nigeria. The researchers found from the study, a difference in Mean Retention Level Scores and then subjected same to z-test analysis; the result found indicated a significant difference in favour of the experimental group. The researchers consequently recommended the use of Language of the immediate environment of the child as medium of instruction in schools in Nigeria. In a study by Bashir (2018), the researcher found very high interest among students in the use of Hausa Language as medium of teaching Mathematics. Significantly, the study found out that interest of student was not tied to the Hausa language as their mother tongue but as a prevalent language of the community which they also speak.

It has been argued that the non-exploration of the Mother tongue medium, which is not to the overall interest of the common man in Nigeria, is hindering advancement in education and other sectors of the economy. Oladotun and Francis (2014) observed that all over the world especially, amongst the developed countries of the world the Mother's-Tongue is usually used in the school system as the medium of instruction. Despite the results of researches that have shown the advantages of educating children in their mother tongue, adopting the Mother Tongue medium still meets with resistance. This suggests that the controversy over the MT usage in Science instruction is not only educational but also political (Wushishi, 2010).

There has been argument that some languages lack orthographies, thereby making the implementation tedious. However, this assertion is not true for other languages, such as the Hausa language. The Hausa language and some other languages in Nigeria have rich orthographies and are widely used as medium of communication by millions of people across the country. Hausa Language, for example, is one of the Major Nigerian Languages and has more native speakers than any other language in West Africa. Out of the ethnic groups in Nigeria, Garba (2014) listed Hausa among the largest and most dominant ones. Bashir (2018) observed that there is availability of Hausa style guide by Microsoft Corporation (2006) and Hausa font called the *Rabiat Muhammad.* With this development lower case as well as upper case of special Hausa characters such as ɓ, ɗ, ƙ, fy, gy, gw, kw, ky, ƙw ƙy ts, sh. are all available via the computer thereby signifying wide usage of the language for communication including via the computer. Communication using indigenous languages in Nigeria takes place within and outside the school. This is a factor that could aid learning since meaningful learning takes place if there is effective classroom communication (Hassan, 2014).

Communication is relevant in concept formations, and since the intent of science is concept formation and the concepts are its contents, a more familiar language usage in the classroom can aid learning of science. The whole package of education as observed by Bakie (2000) has three levels; the content of the education, that is, the syllabus, the teaching of the subject and learning and thirdly the environment of learning. Intended learning outcomes, contents and methods or learning experiences and evaluation are the basic elements of any curriculum. Also, it should not be forgotten that the content of any curriculum should be derived from the environment where it is to be operated. The teaching of the content must be in a manner that ensures meaningful learning through effective communication. Effective communication is only ensured through the use of indigenous language/language of the environment otherwise known as mother tongue (L1). So, to teach in mother tongue in Nigeria's Classroom would certainly have some curricular implications.

Curricular implications for Teaching STM in Mother Tongue in Nigeria

The argument for the use of Mother Tongue no doubt has illicited support from cognitive development based researchers on learning using first language of the students in many countries. There are nevertheless other intractable and contentious issues that need to be resolved if at all the draem of utilising Mother Tongue for instruction will suffice. No doubt, use of MT may radically address our inability as nation to indegenize scientific concepts even though science and teachnology are what can be seen in our traditional or local artifacts of our contemporary day –to day activities. The list of curricular implications may not be exhaustable, however, the following implications are instructive:

i. Developing Teaching Learning Resources for Instruction in STM Using Mother Toungue. The problem with many learners is how we can mainstream content of instruction to familiar language. And to teach using Mother Tongue will require developing textbooks, teaching manuals, workbooks (print and digital), charts, library etc in Mother Tongue. To achieve these will require a lot of funds and workshops to develop.

ii. Language of Instruction has to be MT in a multilingual environment for STM teaching**.** Nigeria is a multilingual society and thus have the problem of which language to adopt as language of instruction for her educational system. Where such a problem is overcomed, then the issue of language development for autography (determination of vocabularies and syntax) will certainly have to be strengthened to produce more autographies for minority languages. . Therefore, the National Educational Research and Developmen Council (NERDC) and Nigeria Institute of Languages (NIL) should develop policy framework for actualization of the language of instruction policy across all the levels of education in Nigeria.

iii. Designing Curricular in the various aspects of Science Technology and Mathematics will become a problem. This will require assembling experts in various fields with language specialist to carefully transcribe the Sceince Technology and Mathematical concepts into acceptable language metaphore for instruction. The process will entail pilot testing and revision, field-trail and revision before full-scale implementation. These are proceseses that can last several months to years but the result will be a breakthrough for implementation and possible realisation of educational policy for enduring industrialization for the country.

iv. Pedagogical approaches for the instruction of STM in MT. Each area of specialization in Science Technology and Mathematics shall require a procedure of cognition appropriate to its uniqueness. Using Mother Tongue to instruct will automatically require how to translate the all known methodologies to the language of the instruction.

v. Method of assessments would definitely follow the mode of implementation of the curriculum. The reality is that, it may require students to write or be evaluated in language which instruction was received. This definitely will pose a lot of challenges and create immeasureable issues ranging from validation and reliability of the outcome of the process of education.

vi. Teacher Training to implement Mother Tongue for STM. UNESCO (2003) advocated the adoption of Mother Tongue (L1) at early grades to enhance children's ability to learn better compared to the use of second language (L2) i.e. English language or foreign language. This proclamination still have left a gap with attendant failure or poor implementation at basic education levels in Nigeria. The question would be, what reforms need to be undertaken in order to implement the use of Mother Tongue for Science Technology and Mathematics Education trainning teachers to effectively implement the use of Mother Tongue.

Conclusion and Recommendation

The subject of using Mother Tongue as a medium of instruction has remain a beautiful thing on paper but rarely have scholars evolve practically implementable frameworks for using indegnous language (L1). How will Nigeria with a list of over 500 langauages and 250 ethnic groups adopt one Mother Tougue as medium of instruction in its educational system. If we draw inference from Mahatma Gandhi who was the greatest proponent of 'Mother Tongue' usage as a language of instruction at primary education who was believed to be wrong in his thinking with India having more than 2000 languages at the beginning of 20^{th} century (Dhananjay, 2016) then Nigeria has to evolve its unique method of attainment of its goal of implementing the Mother Tongue instructional approach. Thus, it is strongly recommended that, each region should adopt its own predominant language as a medium of instruction. This argument is hinged on the earlier finding of Bashir (2018). Furthermore, each region could adopt its own policy on education that suits its peculiarity in tandem with the National Policy on education. The United States of America (USA) has it that education is chiefly a matter of the state. Thus, the practicability of the use of Mother Tongue as language of instruction for STM in Nigeria should be left to the regions to decide and apply based on their peculairty.

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SELF-EFFICACY AND BEHAVIOURAL INTENTION OF PRE-SERVICE TEACHERS TOWARDS ELECTRONIC TEACHING IN NIGER STATE, NIGERIA

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Abstract
This study was carried out to investigate the self-efficacy and behavioural intention of pre-service teachers towards electronic teaching in Niger State, Nigeria. Descriptive survey research design was employed and 441 pre-service teachers in tertiary institutions in Niger State constituted the research sample. Four research questions and two null hypotheses guided the study and a 20-item questionnaire was used as instrument for data collection. The questionnaire was validated by educational technology experts. Pilot test was carried out and reliability coefficients of 0.84 and 0.87 were obtained for the two constructs sections of the questionnaire. Data collected from the administration of the research instrument were analysed using descriptive and inferential statistics of Mean, Standard Deviation and t-test. However, because there were no significant difference between male and female self-efficacy and behavioural intention, the two null hypotheses were not rejected. A decision rule was set, in which a mean score of 3.0 and above was considered Agreed, while a mean score below 3.0 was considered Disagreed. Findings revealed that pre-service teachers have high level of self-efficacy in using electronic resources for teaching with grand mean score of 3.57. Also, pre-service teachers' response based on their intention towards electronic teaching was positive with a grand mean score of 4.35. Based on these findings, it was recommended that resources that will aid the delivery of teaching in electronic mode should be put in place for teachers in primary and secondary schools in order to improve the quality of teaching.

Key Words: Electronic resources, Self-efficacy, Behavioural intention, Pre-service teachers

Introduction
The influence of digital technology in the society has made electronic teaching a basic requirement needed in the 21st Century education sector. Electronic teaching entails the use of Information and Communication Technology (ICT) in education can accelerate the achievement of national educational goals by connecting learners and teachers together for professional support services through electronic teaching. Teaching is becoming one of the most challenging professions in the society today where knowledge is expanding so rapidly that modern technologies demand the use of Information and Communication Technology (ICT). ICT is defined, as a diverse set of technological tools and resources used to communicate, to create, disseminate, store and manage information. ICT has become within a short time one of the basic building blocks of a modern society. Many countries now regard understanding ICT and mastering its basic concepts as part of the core of education (UNESCO, 2002).

ICT has become an integral part of the human society and this development has challenged the traditional role of teaching in the educational sector. Now, education is tailored towards equipping the learner with technology and information literacy, problem solving skills, critical reasoning, and the ability to use digital technology in accessing and utilising information for problem-solving. These knowledge components often described as ICT-literacy has become part of the basic labour requirement in knowledge driven societies; and a necessary foundation for higher education and professional development (Garba & Alademerin, 2014). ICT in education implies the use of technology which consists of electronic devices and associated human interactive materials that enables the user to employ them for a wide range of teaching-learning process. It is also a mode of education that uses information and communications technology to support, enhance, and optimise the delivery of information (Luszczynska & Schwarzer, 2005). The National Policy on Education places emphasis on the provision and utilization of Information and Communication Technology (ICT) in Nigerian schools when it states that in recognition of the prominent roles of information and communication technology in advancing knowledge and skills necessary for effective functioning in the modern world, there is urgent need to integrate ICT into education in Nigeria (FRN, 2013).

Electronic teaching involves computational systems that communicate and cooperate with learners at many levels. It is also a teaching style that involves the use of computers and multimedia devices to support the process of teaching and learning in a classroom (Bennet & Coleman, 2018). Every nation strives towards the provision of quality education for its citizens, because of the realization that education is necessary to engineer and consolidate any nation's developmental process. However, achieving quality education would be a mirage if teacher's training programs are not in good shape. Teacher's training program refers to a program that is related to the development of teacher's proficiency and competence that would enable and empower the teachers to meet the requirements of the profession and face the challenges therein (Oancea, 2014).

There is no doubt that teacher education is a veritable tool towards educational development. This fact was given credence to by the National Policy on Education when it stated that Teacher education will continue to be given a major emphasis in all educational planning, because no education system can rise above the quality of its teachers (Akindutire & Ekundayo, 2012). Teacher training program refers to the policies, procedures, and provision designed to equip prospective teachers with the knowledge, attitudes, behaviours, and skills they require to perform their tasks effectively in the classroom, school, and wider community. The professionals who engage in this activity are called teacher educators. Those who enrol for teacher training programmes are often referred to as pre-service teachers (Allen, 2011).

Pre-service teachers are individuals who are in a teacher-education programme in order to pursue teaching credentials in public schools or private sectors domestically or internationally (Judith-Ann, *et al* 2014). Pre-service teachers need the capacity to integrate Information and Communication Technologies (ICTs) in ways which harness their learning affordances and develop students' digital literacies. This capacity is given to them during the course of their teacher training programme as they are tutored by teacher educators on how to effectively manage ICT in their teaching profession. However, effective ICT integration in the classroom depends on the pre-service teacher's self-efficacy and behavioural intention towards the use of ICT facilities during and after his/her teacher training programme (Gill, *et al* 2015).

Self-efficacy is the belief a person has in his/her own abilities, specifically one's ability to meet the challenges of life ahead and complete every task successfully (Akhtar, 2008). Self-efficacy is an individual agency or judgement of one's capabilities to organize and execute courses of action required to attain designated types of performance (Issa et al, 2018). Self-efficacy is not about what and individual has but belief in what an individual can do with whatever resources one can master. Self-efficacy can also be a personal judgement of how well one can execute courses of action required to deal with prospective situations (*Bandura, et al 2003)*. A pre-service teacher's self-efficacy in the aspect of electronic teaching refers to overall belief of an individual in his/her ability to succeed while using various ICTs facilities to impart knowledge on students through electronic teaching. Pre-service teachers who have high self-efficacy will exert sufficient effort that, when well executed, will lead to successful outcomes, whereas those with low self-efficacy are likely to cease effort early and fail (Kolbe, 2009).

Behavioural intention according to committee on communication for behaviour change (2002) is an individual perceived likelihood or subjective probability that he/she will engage in a given behaviour. Behavioural intention is the likeness of a person or an individual having a recurrent plan or decision to use a delivery method that directly affect the overall delivery type. Individuals' intention toward technology determine the actual usage (Falode, 2018). Behavioural intention in this context is a degree to which an individual has formulated conscious plan to perform or not to perform in using electronic method of teaching.

In the society today, there are many dimensions in which people are differentiated. One of these dimensions is gender. As noted by the United Nations, gender refers to the social attributes and opportunities associated with being male and female and the relationships between women and men and boys and girls. In some societies there are more women than men while in some other societies, reverse is the case. There are various jobs/activities that are attributed to a specific gender, and when the opposite gender indulge in such activities, it is termed a taboo and people from that gender are often discriminated (United Nations, 2008).

In this era of Information and Communication Technology (ICT), teaching techniques are shifting from being teacher centred to learner-centred. Most developed countries have exploited the potentials of educational technology tools such as computers, projectors, smart boards, Digital Versatile Disk (DVD) players, interactive software among others to transform their teaching-learning process. These education technology tools make teachers better efficient, learning better achieved and teaching-learning effective.

Unfortunately, schools in Nigeria are yet to extensively adopt these educational tools for teaching-learning process. Majority of Nigerian teachers are still using the traditional talk and chalkboard method of teaching. This traditional method of teaching keeps student passive in the class against the learner-centred learning approach thereby affecting their academic output and obviously does not prepare students for the information age and globalization. To enable students derive maximum benefits associated with technology in curriculum delivery and align Nigeria properly with the rest of the technological world. Nigerian government and other stakeholders in education must adopt the full implementation of electronic teaching in Nigerian schools by incorporating new skills and technologies that will encourage electronic teaching into pre-service teachers' preparation programmes.

However, studies have revealed that lack of attention to integration of ICTs in pre-service teachers' preparation programmes limits its use during classroom activities. Now the question is if significant attention should be paid to integration of ICTs in pre-service teachers' preparation programmes in order to extensively adopt electronic teaching in Nigerian Schools, what is the level of self-efficacy of pre-service teachers towards electronic teaching? If they have high level of efficacy, what is their behavioural intention towards electronic teaching? It is on this note that the researcher intends to investigate the self-efficacy and behavioural intention level of pre-service teachers towards electronic teaching in Niger State, Nigeria.

Research Questions

The following research questions guided the study:

1. Do pre-service teachers have self-efficacy in using electronic resources meant for electronic teaching?

2. What is the behavioural intention of pre-service teachers' towards electronic teaching?

3. What is the influence of gender on the self-efficacy of pre-service teachers in Niger State in using electronic resources?

4. What is the influence of gender on pre-service teachers' behavioural intention towards electronic teaching in Niger State, Nigeria?

Research Hypotheses

The following null hypotheses were formulated and were tested at 0.05 level of significance:
Ho_1: There is no significant difference between male and female pre-service teachers' self-efficacy on electronic teaching in Niger State, Nigeria.

Ho_2: There is no significant difference between male and female pre-service teachers' behavioural intention towards electronic teaching in Niger State, Nigeria.

Methodology

The research design that was adopted for this study is a descriptive survey design. The methodology involves the use of questionnaire to obtain the needed data from respondents.

The population of this study comprises all 62,531 pre-service teachers from institutions of higher learning that offer educational courses in Niger state. 4,428 Final year pre-service teachers in Schools of Education of all the selected institutions constituted the target population because they have successfully completed teaching practice exercise. The sample for this study comprises of 441 final year pre-service teachers from school of education in the selected four higher institutions of higher learning in Niger State.

A multi-stage sampling technique was employed in selecting respondents for this study. Firstly, purposive sampling procedure was used to select four tertiary institutions of learning in Niger State which are all owned by the state and the Federal Government because education courses are offered in these institutions. Sample selected cut across both male and female pre-service teachers in the selected tertiary institutions of learning. Thereafter, convenience sampling was used to select final year pre-service teachers from faculty of education. Reasons being that it is difficult to sample students from all academic discipline.

The research instrument that was used in this study to collect needed data is researcher-designed questionnaire named; Questionnaire on Self-efficacy and Behavioural intention of Pre-service teachers for Electronic Teaching (QSBET). The questionnaire was a close-ended questionnaire and it consist of 20 items and three sections A, B, & C. Section A was used to collect demographic data of the respondents. Section B, consist 10 items to collect data on the respondents self-efficacy in using electronic teaching devices. Section C consists of 10 items to collect data on respondent's behavioural intention towards electronic teaching. Sections B and C was presented using a 5-point Likert scale in which Strongly Agree (SA) was awarded 5 points, Agree (A) was awarded 4 points, Undecided (U) was awarded 3 points, Disagree (D) was awarded 2 points and Strongly Disagree (SD) was awarded 1 point. A decision rule was set, in which a mean score of 3.0 and above was regarded as agreement while mean score below 3.0 was regarded as disagreement.

The questionnaire was validated by three educational technology experts in the Department of Educational Technology and one ICT expert from Computer Science Department, all from Federal University of Technology, Minna. The reliability of the research instrument was determined after pilot test on 20 pre-service teachers from School of Technical Education, Niger

State College of Education, Minna, which is part of the population, but not part of the sample for this study since they share related characteristics. The scores that were obtained were computed using Cronbach's Alpha formula and coefficient index of 0.84 and 0.87 were obtained from the variables, Self-efficacy and behavioural intention respectively. Based on the coefficient obtained, the instrument was considered reliable.

The data collected from the sampled final year pre-service teachers were analysed using descriptive and inferential statistics. The research questions were answered using descriptive statistics of mean and standard deviation. The mean response below 3.0 was adjudged as disagreement, while mean response of 3.0 and above was adjudged as agreement. The t-test statistics was used to test the null hypotheses; the significant level was ascertained at alpha level of 0.05. The Statistical Package for Social Science (SPSS Version 23) was used for the analysis.

Results

In this section, Table 1-6 are presented with their interpretations tailored towards providing answers to the research questions raised to guide this study and the testing of hypotheses.

Table 1: Mean and standard deviation of pre-service teachers' response on their self- efficacy in using electronic resources

S/N	Item	N	$\bar{x}$	Std. Dev	Decision
1	I can operate a computer and install software.	441	3.57	1.319	Agree
2	I can use computer and other ICT tools for teaching.	441	3.48	1.290	Agree
3	I can install teaching softwares on my PC.	441	3.49	1.288	Agree
4	I can upload my work to online platforms.	441	3.52	1.306	Agree
5	I can prepare power point presentations.	441	3.53	1.300	Agree
6	I can generate my lesson content from the web.	441	3.45	1.368	Agree
7	I can connect projector to computer to make my presentation.	441	3.78	1.252	Agree
8	I can teach my students how to prepare power point and encourage them to use it in their presentations	441	3.71	1.211	Agree
9	I can use E-teaching platforms to cover my scheme of work	441	3.54	1.252	Agree
10	I feel comfortable using E-teaching as a tool for teaching and learning.	441	3.66	1.197	Agree
	Average Mean		**3.57**		

Decision mean = 3.0

Table 1 shows the mean and standard deviation of pre-service teachers' response on their self-efficacy in using electronic resources. The table shows the calculated mean score of 3.57 with Standard Deviation of 1.319 for item one, mean of 3.48 with Standard Deviation of 1.290 for item two, mean of 3.49 with Standard Deviation of 1.288 for item three, mean of 3.52 with Standard Deviation of 1.306 for item four, mean of 3.53 with Standard Deviation of 1.300 for item five, mean of 3.45 with Standard Deviation of 1.368 for item six, mean of 3.78 with

Standard Deviation of 1.252 for item seven, mean of 3.71 with Standard Deviation of 1.211 for item eight, mean of 3.54 with Standard Deviation of 1.252 for item nine and mean of 3.66 with Standard Deviation of 1.197 for item ten. The table reveals further that, the average mean score of responses to the 10 items is 3.57 which were greater than the decision mean score of 3.0. This implies that the pre-service teachers have high level of self-efficacy in using electronics resources for teaching.

Table 2: Mean and standard deviation of pre-service teachers' response on their behavioural intention toward the usage of electronic resources for teaching

S/N	Item	N	$\bar{x}$	Std. Dev	Decision
1	I intend to adopt electronic teaching in my teaching career.	441	4.24	0.967	Agree
2	I will adopt electronic teaching in order to interact with intellectuals and scholars worldwide.	441	4.07	0.891	Agree
3	I intend to adopt electronic teaching because it is less strenuous and more effective.	441	4.14	0.795	Agree
4	I intend to adopt electronic teaching because it requires participation of the teacher and the learners.	441	4.18	0.844	Agree
5	I intend to use electronic teaching to encourage full attentiveness of the students.	441	4.31	0.733	Agree
6	I plan to use electronic teaching forum to enrich my knowledge.	441	4.46	0.886	Agree
7	I intend to adopt electronic teaching because it makes communication with students and other teachers to be easy.	441	4.19	0.919	Agree
8	I intend adopting electronic teaching because it helps in accessing information and educational materials used in teaching.	441	4.24	0.827	Agree
9	I plan to adopt electronic teaching because it brings about easy monitoring of learners progress.	441	4.29	0.731	Agree
10	I plan to adopt electronic teaching because it makes lesson preparation and presentation easy.	441	4.25	0.823	Agree
	Average Mean		**4.35**		

Decision mean = 3.0

Table 2 shows the mean and standard deviation of pre-service teachers' response on their behavioural intention toward the usage of electronic resources for teaching. The table shows the calculated mean score of 4.28 with Standard Deviation of 0.967 for item one, mean of 4.07 with Standard Deviation of 0.891 for item two, mean of 4.14 with Standard Deviation of 0. 795 for item three, mean of 4.18 with Standard Deviation of 0.844 for item four, mean of 4.31 with Standard Deviation of 0.733 for item five, mean of 4.46 with Standard Deviation of 0.886 for item six, mean of 4.19 with Standard Deviation of 0.919 for item seven, mean of 4.24 with Standard Deviation of 0.827 for item eight, mean of 4.29 with Standard Deviation of 0.731 for item nine and mean of 4.25 with Standard Deviation of 0.823 for item ten. The table reveals further that, the grand mean score of responses to the 10 items is 4.24 which were greater than the decision mean score of 3.0. This implies that the pre-service teachers have good behavioural intention towards electronics resources for teaching.

Table 3: Mean and standard deviation response based on gender influence on the self-efficacy of pre-service teachers in using electronic resources

Gender	N	$\bar{x}$	Std. Deviation
Male	148	35.27	9.898
Female	293	35.96	9.251
Total	**441**		

Table 3 shows the mean and standard deviation respondents on gender influence on the level of self-efficacy of pre-service teachers in using electronic resources. The result indicated that the mean and standard deviation of the two groups differ with a mean score of 35.27 with standard deviation of 9.898 for male pre-service teachers and mean score of 35.96 with standard deviation of 9.251 for female pre-service teachers. Hence, the mean response of female pre-service teachers is higher than that of male pre-service teachers.

Table 4: Mean and standard deviation response based on gender influence on the behavioural intention of pre-service teachers towards utilization of electronic resources

Gender	N	$\bar{x}$	Std. Deviation
Male	148	42.86	4.029
Female	293	42.11	6.426
Total	**441**		

Table 4 shows the mean and standard deviation respondents on gender influence on the behavioural intention of pre-service teachers towards utilization of electronic resources. The result indicated that the mean and standard deviation of the two groups differ with a mean score of 42.86 with standard deviation of 4.029 for male pre-service teachers and mean score of 42.11 with standard deviation of 6.426 for female pre-service teachers. Hence, the mean response of female pre-service teachers is higher than that of male pre-service teachers.

Hypothesis 1: There is no significant difference between male and female pre-service teachers' self- efficacy on electronic teaching in Niger State, Nigeria. To test this hypothesis, sample t-test independent is applied on the male and female pre-service teacher's response score regarding their self-efficacy in using electronic resources for teaching as presented in Table 5.

Table 5: t-test result of male and female pre-service teachers response based on the self-efficacy in using electronic resources

Gender	N	Df	$\bar{x}$	S.D	t-value	p-value
Male	148		35.27	9.898		
		439			0.721^{ns}	0.471
Female	293		35.96	9.251		

NS: Not Significant at 0.05 level

Table 5 presents the result of t-test result of male and female pre-service teachers response based on their self-efficacy in using electronic resources. The mean score of the male and female are 35.27 and 35.96 respectively. The t-value of 0.721 was not significant at 0.05 alpha level, and the p-value of 0.688 is greater than 0.05. Therefore, hypothesis one was accepted. This indicates that there is no significant difference between male and female pre-service teachers' self- efficacy on electronic teaching in Niger State, Nigeria. This implies that both male and female pre-service teachers have the same level of efficacy in using electronic recourses' for teaching.

Hypothesis 2: There is no significant difference between male and female pre-service teachers' behavioural intention towards electronic teaching in Niger State, Nigeria. To test this hypothesis, sample t-test independent is applied on the male and female pre-service teachers' response score regarding their behavioural intention in using electronic resources for teaching as presented in Table 6.

Table 6: t-test result of male and female response based on the behavioural intention of pre-service teachers in using electronic resources

Gender	N	Df	$\bar{x}$	S.D	t-value	p-value
Male	148		42.86	4.029		
		439			1.289^{ns}	0.198
Female	293		42.11	6.426		

NS: Not Significant at 0.05 level

Table 6 presents the result of t-test result of male and female pre-service teachers response based on their behavioural intention towards electronic teaching. The mean score of the male and female are 42.86 and 42.11 respectively. The t-value of 1.289 was not significant at 0.05 alpha level, and the p-value of 0.198 is greater than 0.05. Therefore, hypothesis two was accepted. This indicates that there is no significant difference between male and female pre-service teachers' behavioural intention towards electronic teaching in Niger State, Nigeria. This implies that both male and female pre-service teachers have the same behavioural intention on electronic teaching.

Discussion of Findings

Finding of this study on the self- efficacy of pre-service teachers' on electronic teaching in Niger State, Nigeria indicated that pre-service teachers have high level of efficacy in using electronic resources for teaching in Niger state. Hypothesis one finds out if there is significant difference between male and female pre-service teachers' self- efficacy on electronic teaching in Niger State, Nigeria. The result shows that gender has no influence on pre-service teacher self-efficacy in using electronic resources for teaching with the mean of 35.27 for male and 35.96 for female and the p-value of 0.471 which is not significant at 0.05 alpha level. This finding is in line with the earlier findings of Vehbi (2012) and Margaret & Al-Zahrani (2012), who found out that pre-service teachers have self-efficacy about using electronic resources for teaching.

Finding of this study on the behavioural intention of pre-service teachers' towards electronic teaching in Niger State, Nigeria indicated that pre-service teachers have positive intention towards the usage of electronic resources for teaching in Niger state. Hypothesis two finds out if there is significant difference between male and female pre-service teachers' behavioural intention towards the usage of electronic teaching in Niger State, Nigeria. The result shows that gender has no influence on pre-service teachers' behavioural intention towards the usage electronic resources for teaching with the mean of 42.86 for male and 42.11 for female and the p-value of 0.198 which is not significant at 0.05 alpha level. This finding is in line with the earlier findings of Davis and Venkatesh (2004) and Abu-Dalbouh (2013) that an individual's intention to use a particular technology determines the actual usage of such. This study is also in line with the earlier finding of Alharbi and Drew (2014) who found that behavioural intentions of academics towards usage of electronic learning was positive. Pre-service teachers' willingness and positive behavioural intentions towards the usage electronic resources for teaching and learning was as a result of their level of efficacy in the usage of the package.

Conclusion

Findings of this study have revealed that pre-service teachers in Niger State have self-efficacy in using electronic resources for teaching. There is no gender difference towards the behavioural intention of pre-service teachers in using electronic resources for teaching in Niger state. For optimum teaching and global interaction point, pre-service teachers should be able to use electronic resources effectively and they need to be well prepared. The use of electronic resources when it is well tailored would in no doubt improve the teaching and learning process.

Recommendations

Based on these findings, it was recommended that resources that will aid the delivery of teaching in electronic mode should be put in place for teachers in primary and secondary schools in order to improve the quality of teaching.

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ASSESSMENT OF THE IMPLEMENTATION OF BASIC SCIENCE AND TECHNOLOGY CURRICULUM IN JUNIOR SECONDARY SCHOOLS IN NIGER STATE, NIGERIA

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Abstract
This study is aimed at the Assessment of the Implementation of Basic Science and Technology Curriculum in Junior Secondary Schools in Niger State. The researcher made use of the survey research design with two hundred and twenty (220) Basic Science and Technology teachers respondents as sample size and questionnaire was used as research instrument. In the data analysis, percentage scores was used in analyzing personal data, while mean and standard deviation was used to answer the research questions. Pearson Product Moment correlation co-efficient (r) was used to test the null hypotheses (1, 2 and 3) at 0.05 level of significant. The research findings show that the implementation of Basic Science and Technology curriculum in junior secondary schools is significantly affected by the adequacy of content of Basic Science and Technology curriculum and awareness of teachers. In addition, there is a significant relationship that exists between qualification and experience of teachers involved in the implementation of Basic Science and Technology curriculum in junior secondary schools. Furthermore, it was revealed that significant relationship exists between strategies/methods used and the implementation of Basic Science and Technology curriculum in Junior Secondary Schools. Also, the findings reveal that the implementation of Basic Science and Technology curriculum in junior secondary schools level is significantly affected by availability of instructional materials adequacy. The study also reveals that significant relationship exists between learning environment and its adequacy in Basic Science and Technology and its implementation in junior secondary school level. Also, teachers with high working experience are larger in number compared to teachers with low working experience. Finally, the research work recommended among others that there should be general awareness on the importance of Basic Science and Technology as an agent of positive change in the society; employ qualified and trained Basic Science and Technology teachers to implement the curriculum; send Basic Science and Technology teachers to in-service courses and sponsor them for workshops and seminars.

Keywords: Assessment, basic science and technology, curriculum and implementation

INTRODUCTION

The importance of science and technology to national development in the life of any country cannot be overemphasized. This is because knowledge and skills in science and technology are very vital in the development of any society. Mulemwa (2012) points out that, the fast changing applications of science and technology and the global reliance on its processes and products in all areas of human endeavor have made them invaluable that any society or country without them risks being alienated from the global village. This means that for an individual to be well-grounded in science, and competent enough to face the challenges of life in his society, he or she must have gone through a science programme that is well planned, assessed and implemented.

The 21st century world is driven by science and technology. Baikie (2010) describes science and technology as the engine for national growth and development. It is therefore understandable that nations across the globe place emphasis on science education. Hencer (2011) sees science education as education through science while Blasa & Bello (2018) describes science education as 'education in science'. Simply put, science education is a field of study that concerns itself with the production and promotion of scientifically literate society in which the citizens should be able to apply basic science principles in dealing with real world issues and concerns.

To produce and promote a scientifically literate society, the role of science teachers and scientists become very crucial and requires synergy and very close cooperation between these groups of professionals. While the scientists' work leads to the creation of new scientific materials in form of scientific knowledge, language and skills, that of the teacher involves devising ways and means of, and successfully transmitting scientific materials to learners, with focus towards their application in dealing with contemporary real-world issues and concerns. .In a school setting, science teachers are the 'bridge' between the professional scientists and the learners of science (Ajaja & Kpangbon, 2014).

No nation can develop to its fullest and keep pace with modern societal trends in science and technology without effective and efficient education. Education is a basic force for the socio-economic and political transformation of the society (Mulemwa, 2012). The transformation agenda of vision 20: 2020 is feasible in Nigeria through Basic Science and Technology at the junior secondary school if the content of Basic Science and Technology curriculum is effectively implemented. Basic Science and Technology teachers" classroom instructional effectiveness is instrumental to the effective implementation of the Basic Science and Technology curriculum in junior secondary schools. The Federal Republic of Nigeria (2013) National Policy on Education noted that the quality of effective teaching is depended on the capability of trained Basic Science and Technology teachers and ability to stimulate learning to an appreciable extent. According to Blasa & Bello (2018) the method adopted by Basic Science and Technology teachers is a strong factor that can affect learners" level of achievement.

The researcher further maintained that method of instruction is a vehicle or strategy for teacher-learner communication, and that the neglect of adequate instructional strategies is a pedagogical competency deficiency. Accounting for the weaknesses in the effective instructional implementation of Basic Science and Technology curriculum in Nigerian secondary schools, Agbo (2016) observed that integrated Basic Science and Technology curriculum in junior secondary school suffers from instructional neglect which is largely attributed to teachers inability to come to grip with the peculiar pedagogical demands of the subject.

It is the dynamism in teaching and learning of Basic Science and Technology that set the stage for the realization of the reformative objective of Vision 20:2020, because learners are trained to acquire positive skills, attitudes and values to reform their country's economy.

Teachers' instructional methods facilitate the teaching and learning of Basic Science and Technology. Onwuegbuna (2015) identified three methods that should be applied in the effective teaching of Basic Science and Technology as expository or class teaching methods, problem solving method and activity method. Basic Science and Technology instruction to young learners requires practical learning activities or exposure to issues endemic to the learning environment. The Basic Science and Technology teacher in order to achieve maximal teaching and learning of basic science and technology in the classroom has to employ techniques that will exercise learner interest.

Statement of the Problem

Basic Science and Technology education programmes are not being constantly evaluated in order to ensure its effectiveness and whether the objectives of the programme are being achieved. Feedback mechanism with regard to ensuring whether the stated objectives are being attained or not is only possible through evaluation. Thus, evaluation is an integral part of all educational programmes. Unfortunately, instances like lack of effective evaluation in the area of textbooks, instructional materials, teachers, methods as well as inconsistencies of policies affecting Basic Science and Technology, is what characterized the programme in Nigeria in general perspective and Niger State in particular at the Junior Secondary School level.

Purpose of the Study

The focus of this study is therefore to:

1. Ascertain the adequacy of the content of the Basic Science and Technology curriculum in Junior Secondary Schools.

2. Assess the appropriateness of the strategies, methods and techniques used in the implementation of Basic Science and Technology curriculum in Junior Secondary Schools.

Research Questions

The Study sought answers to the following research questions.

1. How adequate is the content of the Basic Science and Technology curriculum for Junior Secondary Schools?

2. How appropriate are the strategies, methods/techniques used by teachers in the implementation of Basic Science and Technology Curriculum in Junior Secondary Schools?

Hypotheses

Based on the objectives and research questions, the following hypotheses were developed.

Ho_1: There is no significant relationship between views on the adequacy of the content of Basic Science and Technology and its implementation in Junior Secondary Schools.

Ho_2: There is no significant relationship between strategies, methods and techniques that aid learning of Basic Science and Technology and its implementation at the Junior Secondary School level.

Methodology

Survey research design was adopted for the study. The study focused on investigating the extent of Basic Science and Technology teachers application of narrative pedagogies in the implementation of Basic Science and Technology curriculum and its improvements which are appropriate in inculcating requisite knowledge and skills for achieving the objectives of the programme in our secondary schools. The population of the study consists of all Basic Science and Technology teachers in Niger state. The sample consists of two hundred and twenty Basic Science and Technology teachers constituting forty 40% of the entire population of the study. A proportionate stratified random sampling technique was used in the selection of respondents.

The researcher constructed an instrument titled Basic Science and Technology Teachers Instructional Strategies (BSTTIS) as the major instrument used for the study. The instrument was validated by two experts from the department of Industrial and Technology Education

Department, Federal University of Technology, Minna. To achieve reliability, the instrument was subjected to a pilot test. To determine the reliability correlation co-efficient (r), five (5) public junior secondary schools were selected. Three junior secondary schools from Kutigi Educational Zone. Hence, fifty (50) Basic Science and Technology teachers from the schools were selected for the purpose. The schools and teachers selected were excluded from the real study. Reliability is the level of consistency of variables used in a research work, in other words their level of logical consistency. In order to achieve this state of reliability and determine the reliability correlation coefficient (r) the Guttman split half method coefficient was adopted. Hence, five (5) public secondary schools each were selected from Kutigi Educational zone and ten (10) Basic Science and Technology teachers from the schools were selected for this purpose. The schools and the teachers selected were excluded from the main study. The result of the pilot test showed Gronbach‟s Alpha part 1 and part 2 to be 0.800 and 0.952 respectively while Guttman split half coefficient was 0.684. An instrument is considered reliable if the coefficient falls between 0.5 and positive +1. Therefore, the instruments are adjudged reliable. The researcher and four trained field assistants who are graduates of Basic Science and Technology were used in the administration of the instrument on respondents. This approach facilitated the study and the results were hundred percent retrieval of administered questionnaire from sampled Basic Science and Technology teachers in Niger State. The data gathered through the use of research instrument were subjected to statistical analysis for interpretation and discussion. Simple percentages and mean were used for tabulating the biographical information and to answer the research questions. The decision rule was 3.0 cut off point. The researcher made use of Pearson Product Moment Correlation (PPMC) statistics to analyse all the null hypotheses. The hypotheses were rejected or retained at 0.05 level of significance.

Results

Research Question 1
How adequate are the contents of Basic Science and Technology curriculum and awareness of the teachers in the implementation as it affects objectives of the programme in JSS schools?

Table 1: Perceptions of respondents on adequacy of the content of Basic Science and Technology curriculum and awareness of the teachers in the implementation as it affects objectives of the programme in JSS schools

S/N	ITEMS	RESPONSE CATEGORIES				MEAN	STD.DEV
		SA	AG	D	SD		
1	I am aware of the concepts/content in Basic Science and Technology	141	39	7	7	3.6186	.7261
2	I am exposed to the meaning of Basic Science and Technology through studies through conferences	71	75	9	39	2.9175	1.1027
3	my principal has addressed teachers on concepts in Basic Science and Technology	56	83	36	19	2.9072	.9283
4	my subject head has asked me to teach Basic Science and Technology to reflect its objectives	57	96	37	10	2.9691	.8137

5	I have heard of Basic Science and Technology objectives on the media	113	48	16	17	3.3247	.9564
6	teachers are aware that they are potentials agents of achieving Basic Science and Technology objectives in school curriculum	100	68	19	7	3.3454	.8011
7	I have come across written materials on Basic Science and Technology curriculum content	92	75	16	11	2.2784	.8424
8	I will be excited to be exposed that Basic Science and Technology contents are adequate in achieving the objectives of the subject	92	78	10	14	3.2784	.8606
	Cumulative mean			**3.2784**			

Decision mean = 2.5000

The table above showed the perception of respondents on adequacy of the content of Basic Science and Technology curriculum and awareness of the teachers in the implementation as it affects objectives of the programme in JSS schools. It was observed that their cumulative mean response on all the 8 items was 3.2784, which was found to be higher than the decision mean of 2.50000. Specifically most of the respondents are aware of the concepts/content in Basic Science and Technology as this item had the highest mean response of 3.6186 with details showing that 180 were in agreement and the rest 14 in disagreement. In the same vein they believe that teachers are aware that they are potentials agents of achieving Basic Science and Technology objectives in school curriculum as this had the second highest mean response of 3.3454 with details showing that while 168 were in agreement, the rest 26 were in disagreement with this view. This shows that teachers being a potential agent of achieving Basic Science and Technology objectives in school curriculum and being aware of the concepts/content in Basic Science and Technology, has tremendous impact on implementation of Basic Science and Technology curriculum in JSS levels.

Research Question 2:

How adequate is the strategies /methods used in the implementation of Basic Science and Technology curriculum in JSS schools?

Table 2: Perceptions of respondents on adequacy of the strategies /methods used in the implementation of Basic Science and Technology curriculum in JSS schools.

S/N	ITEMS	RESPONSE CATEGORIES				MEAN	STD.DEV
		SA	AG	D	SD		
1	lecture method is dominantly used	74	36	35	49	2.6959	1.2195
2	comparative learning is encouraged by Basic Science and Technology teacher	109	64	5	16	3.3711	.8853

3	practical rejects are commonly given to students	77	95	12	10	3.2320	.7837
4	team work is highly utilized	64	101	20	9	3.1340	.7769
5	teaching is learner-centered	106	63	15	10	3.3660	.9364
6	students are involved in discussing pressing issues	85	78	11	20	3.1753	.9386
7	give assignment that encourage self discovery of knowledge	95	86	5	8	3.3814	.7332
8	I use active teaching strategy	54	72	50	18	2.8351	.9405
9	I allow students to appraise my teaching strategies	41	96	29	28	2.7732	.9440
10	I am competent in the use of computers	80	52	8	54	2.8144	1.2411
11	enquiry oriented assignments are frequently given	52	82	16	44	2.7320	1.0918
12	I use field trip as a teacher's strategy	84	40	21	49	2.8196	1.2356
	Cumulative mean					**3.0275**	

Decision mean = 2.50000

Details in the above table showed the respondents views on the adequacy of the strategies/methods used in the implementation of Basic Science and Technology curriculum in JSS schools. The outcome showed that they are in agreement that, the strategies /methods used in the implementation of Basic Science and Technology curriculum in JSS schools are adequate. Reason being that their cumulative mean response of 3.0275 is higher than the decision mean of 2.50000. Contributing most to this outcome is the giving of assignment that encourage self discovery of knowledge, as this item attracted the highest mean response of 3.3814 as details of response on this item showed that while 181 were in agreement only 13 were in disagreement. It was widely believed that comparative learning is encouraged by Basic Science and Technology teacher as this item had the second highest mean response of 3.3711 with details showing that 153 were in agreement and the rest 21 in disagreement. In conclusion giving assignment that encourage self discovery of knowledge and teachers encouraging comparative learning seriously improve the implementation of Basic Science and Technology curriculum at JSS level.

Testing of Research Hypotheses

Hypothesis One:

There is no significant relationship between adequacy of content of Basic Science and Technology curriculum and awareness of the teachers in the implementation of Basic Science and Technology curriculum in JSS level

Table 3 Pearson Product Moment Correlation (PPMC) statistics on the relationship between adequacy of content of Basic Science and Technology curriculum and awareness of the teachers in the implementation of Basic Science and Technology curriculum in JSS level

Variables	N	Mean	S.D	Correlation Index R	Df	Sig (P)
Implementation of Basic Science and Technology curriculum in JSS level	194	110.474	12.529	0.795**	192	0.000
Adequacy of content of Basic Science and Technology Curriculum and Awareness of the Teachers	194	25.639	3.235			

Correlation is significant at 0.05 level

An understanding of the above Pearson Product Moment Correlation statistics revealed that significant relationship exist between adequacy of content of Basic Science and Technology curriculum and awareness of the teachers in the implementation of Basic Science and Technology curriculum in JSS level.

This is because the calculated significant (p) value of 0.000 is lower than the 0.05 alpha level of significance at a correlation index r level of 0.795 at df of 192. This shows that the implementation of Basic Science and Technology curriculum in JSS level is significantly affected by the adequacy of content of Basic Science and Technology curriculum and awareness of the teachers. Hence, the null hypothesis which state that there is no significant relationship between adequacy of content of Basic Science and Technology curriculum and awareness of the teachers in the implementation of Basic Science and Technology curriculum in JSS level, is hereby rejected.

Hypothesis Two:
There is no significant relationship between strategies/methods used in the implementation of Basic Science and Technology curriculum in JSS level.

Table 4: Pearson Product Moment Correlation (PPMC) statistics on the relationship between strategies/methods used in the implementation of Basic Science and Technology curriculum in JSS level

Variables	N	Mean	S.D	Correlation Index R	Df	Sig (P)
Implementation of Basic Science and Technology curriculum in JSS level	194	110.474	12.529	0.822**	192	0.000
Strategies/methods used in the implementation of Basic Science and Technology curriculum	194	36.329	4.686			

Correlation is significant at the 0.05 level

An understanding of the above Pearson Product Moment Correlation statistics revealed that significant relationship exist between strategies/methods used in the implementation of Basic Science and Technology curriculum in JSS level. This is because the calculated significant (p) value of 0.000 is lower than the 0.05 alpha level of significance at a correlation index r level of 0.822 at df of 192. This shows that the implementation of Basic Science and Technology curriculum in JSS level is significantly affected by strategies/methods used in the implementation of Basic Science and Technology curriculum. Hence, the null hypothesis which state that there is no significant relationship between strategies/methods used in the implementation of Basic Science and Technology curriculum in JSS level, is hereby rejected.

Discussion of Findings

The findings revealed wide scope and high level of difficulty in contents has significant influence on the implementation of Basic science and technology curriculum in schools in the study area. Based on the analysis the null hypothesis was therefore rejected. Further investigation from the research observation indicated that, both the contents and the level of implementation were found to be grossly unsatisfactory in the effective and full implementation of the content. The topics that were supposed to be taught in the previous terms were carried over to the next, leaving most of the topics not taught. The implication is the continuous student's massive failure in both internal and external examinations. The finding is similar to the study of Onwuegbuna (2015) on programme evaluation. The study revealed wide scope and high level of difficulty in contents to students at secondary school level of education. The methodology used by basic science and technology teachers include students participation in class work, assignments, different evaluation techniques and marking of students work.

Conclusion

The study aimed to assess the implementation of Basic Science and Technology curriculum in JSS in Niger State. A total of 194 respondents duly responded to this study. The high point of the analysis includes that: teachers awareness are the potential agents of achieving Basic Science and Technology objectives in school curriculum and being aware of the concepts/content in Basic Science and Technology, has tremendous impact on implementation of Basic Science and Technology curriculum in JSS levels; capacity building workshops perform better in class teaching in my school has tremendous impact on implementation of Basic Science and Technology curriculum in JSS levels; giving assignment that encourage self-discovery of knowledge and teachers encouraging comparative learning seriously improve the implementation of Basic Science and Technology curriculum at JSS level; and instructional materials help learners to remember more of what they have learnt in the class from their teachers and instructional materials used by teachers sometimes are of very relevance to the content/concept being taught by the teachers.

Recommendations

The following recommendations were suggested as a result of the analysis of the study;

- There should be general awareness on the importance of Basic Science and Technology as an agent of positive change in the society.

- Basic Science and Technology teachers should be regularly sent on in-service courses and sponsored to attend workshops and seminars.
- Basic Science and Technology teachers should endeavour to give regular assignment that encourage self discovery of knowledge

- Teachers should be encouraging comparative learning seriously as this improves the implementation of Basic Science and Technology curriculum at JSS level.

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CURRICULUM DEVELOPMENT AND IMPLIMENTATION IN NIGERIA: CHALLENGES AND ISSUES.

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Abstract
Curriculum development is a planning process that results in the specified curriculum plan. It involves decision making that includes selecting and organizing the components of teaching and learning situations. This is done through such activities as the determination of curriculum organizing centers and the specification of suggested objectives, subject matter, activities, resources and measuring devices. Curriculum development leads to the creation of resource units, unit plans, course outline and other curriculum guides that teachers and learners may use to facilitate the learning process. While curriculum implementation starts with the small scale testing involving few number of students who will offer useful suggestions and criticism so as to improve the curriculum before large scale implementation. This paper examines the term curriculum and its importance, concept of curriculum planning, concept of curriculum implementation, the people involved in curriculum planning in Nigeria, society role in curriculum planning and implementation in Nigerian Education system were highlighted.

Keywords: Curriculum; Planning; Implementation; Development.

Introduction
Curriculum planning is a continuous process which involves activities characterized by interrelationships among individuals and groups as they work together in studying, planning, developing and improving the curriculum which is total environment planned by the school. Effective curriculum planning and decision making process is key to the success of educational programs. Education is the instrument for social transformation of a people. It is the vehicle for transferring values, entire, knowledge and experience that make for proper molding and adjustment of an individual to his dynamic environment. Education achieves such laudable objectives through the use of the instrumentality of the curriculum; the curriculum of an educational system contains the aspirations projections and dream of the inhabitants of the system. The contents of a function of the cultural demands of the society, on it are the general education components which complements specific elements in giving a well balanced education to its recipients so as to play relevant roles in the society. Curriculum from the view point of the recipients of school education means different things to different people. It has been seen by some as all the learning experiences that the learner acquired under the guidance of schools directed towards acquiring some skills or competences. People who favour this conception of curriculum attribute the advantage of this definition to its focus on the learner and learning rather than teaching and its inclusion of all experiences of the learners both planned and unplanned. Furthermore, some people focus on its abstract and complex nature-making the curriculum of a school so comprehensive that it cannot be described in simple terms or short phrases.

Concept of Curriculum
Many definitions have been proposed for the curriculum but a close look at each of them will show you one or two disadvantages. There is no clear definition of what a curriculum is. Some definitions are rather centered around student activities, e.g. curriculum is the planned engagement of learners. Some are more subject centered, e.g. "curriculum is the subject matter taught to students or an arrangement of instructional materials. Furthermore, curriculum

can refer to what a school or educational system prescribes for a specific group of learners or at what the teacher does in class. But generally speaking curriculum refers to a macro level as opposed to meso level (e.g. a course) or a micro level (e.g. a lesson). "The curriculum of a school is the formal and informal content and process by which learners gain knowledge and understanding, develop skills, and alter attitudes, appreciations, and values under the auspices of a school. What curriculum means has been extended beyond its dictionary meanings as a course of study to embrace the total spectrums of content, resources, materials and method of teaching through which the purposes of education are achieved (Wasagu, 2000). That is all the experiences both curricular and co-curricular which children pass through to become what is known as an educated person. It has been noted that the definition of curriculum changes from time-to-time and it also changes due to social conditions, conception of knowledge, the learner and, indeed, education. Clearly, therefore, your definition of curriculum is a matter of your own perception.

Functions of Curriculum

i. It concerns itself with the application of the chosen principles.
ii. It determines and assesses what changes have been brought about.
iii. It determines educational direction including the decision of the type of society people want to live and serve in.
iv. It determines the next steps to be taken.
v. It determines the principles and procedures which will help educators in selecting and arranging instructional programmes.

Concept of Curriculum Planning

Curriculum planning refers to the processes involved in developing the curriculum design or plan before the implementation stage. Nggada (2006) identified six stages for curriculum plan which include the formulation of educational objectives or goals for the society which we are designing the curriculum, that is identifying the immediate goals for the society e.g. whether the Nigerian society need administrators, scientists or people with technological background as is the case with Nigeria today. When we have identified that Nigerian society today needs people with technological background, then what are the subjects we should select for the students to have the experience? May be we select subjects which are science biased plus vocational and technical subjects to meet the needs of the society. The next stage is to develop the courses which will lead to the much needed people with technology background for self employment or self reliance.

The next stage is to organize these courses into scope and sequence, i.e. organizing these courses into the various levels to have horizontal and vertical relationship so as to make the students not to see the various courses in isolation. The curriculum planner also identifies the best methods for implementing the course in the classroom for easy learning so that the students can get the best out of the course. The last stage in curriculum planning or design is to evaluate from the first stage to the last stage to identify whether the curriculum planner had succeeded or not. If the processes are not successful then he has to reteach or repeat the whole processes to achieve his goal.

Concept of Curriculum Implementation

Curriculum implementation has been defined in many ways by different people. Mkpa (1987), viewed curriculum implementation "as the execution of the contents of the curriculum document." Mkpa (1987) further describes curriculum implementation as the task of translating the curriculum document into the operating curriculum by the combined effort of the students, teachers and others concerned.

Okebukola (2004) defined curriculum implementation as the translation of the objectives of the curriculum from paper to practice. Okebukola (2004), further notes that the process of curriculum implementation begins when the teacher is handed the curriculum and ends when learners have been exposed to the learning experiences prescribed in the document. To Okebukola (2004), the intermediate steps in curriculum implementation include teaching through verbal and non-verbal exposition, practical work in laboratories, workshops and in the field, student-student interactions, student-material interactions and ten evaluation and feedback. Ivowi (2004), defines curriculum implementation in a nutshell as "the translation of theory into practice, or proposal into action". Saidu (1995), in Garba (2004), is of the view that curriculum implementation is [putting the curriculum into work for the achievement of the goals for which the curriculum is designed.

From all these definitions of curriculum implementation, one can rightly view curriculum implementation as the process of putting all that have been planned as a curriculum document into practice in the classroom through the combined effort of the teachers, learners, school administrators. Parents as well as interaction with physical facilities, instructional materials, psychological and social environment.

The People Involved in Curriculum Planning in Nigeria

Impeccably in Nigeria the curriculum should be planned by the community that is to use it. This is because the community knows its needs and aspirations for their society. Where people are enlightened and government is democratic enough as in U.S.A, the following groups in the society are involved in curriculum planning and implementation, so also the situation should not be different in Nigeria since we are adapting the American system of education.

a) **Teachers:** In Nigeria, teachers are made to implement the curriculum and are not much involved in the development process. However teachers should participate fully in curriculum development process as to have psychological ownership of the curriculum which will give them confidence in the implementation process and also they know their students better and they know the weakness of their students. According to Brown and et al (1982) the curriculum can be a great success or a dismal failure depending on teachers. They are the person who alone can make the curriculum design achieve what it was design to achieve. If they are dedicated, hardworking and imaginative they can enliven what would otherwise be dull and lifeless.

b) **Learners:** They should be included in the curriculum planning process so that their interest could be included and protected. The central focus in curriculum planning and implementation are the learners; both the subject and object without whom the curriculum does not exist. A curriculum design includes aims and objectives which it is hoped will be realized when the curriculum is implemented.

c) **Employers of Labour:** Ministries, banks and other private manufacturing companies, the needs should be considered in planning the curriculum so that the required professionals are not lacking in the society.

d) **Trade Union/Interest Groups:** Trade unions like Academic Staff Union of Universities (ASUU) Academic Staff of Polytechnics (AUUP), College of Education Academic Staff Union (COESU) and Nigeria Union of Teachers (NUT) who will be directly involved in the implementation need to be involved. Pressure groups like Christian Association of Nigeria (CAN) and the Jama'atul Nasir Islam representing the Muslim group should also tale part in planning the curriculum so as not to include things we are contrary to both religions.

e) **National Organizations:** In Nigeria national bodies like the Federal Ministry of Education, National Education Research and Development (NERDC) the Joint Consultative Committee, the Interim Joint Matriculation Board (JMB) the West African Examination Council (WAEC), National Examination Council (NEC), National Board for Technical Education (NBTE), National Commission for Colleges of Education (NCCE), National Universities Commission (NUC) and National Business and Technical Examination Board (NABTEB), Universities, Colleges of Education, Polytechnics, State Miniseries of Education, Education Resources Centers all help to draw up National Policies on Education syllabi and examinations for use within the country because most examinations in Nigeria are of Federal nature. In curriculum planning in Nigeria various State Ministries of Education have to be aware of the needs of their own particular states and of the different areas within these states; in translating what the Federal or national organizations have stipulated as desirable of attainment.

Role of Society in Curriculum Planning and Implementation

N.T.I (2000) mentioned that societies establish schools primarily for five purposes:

a) To transmit the culture of the people.
b) To preserve the society and a nation.
c) To develop the character of the young.
d) To prepare the young for adulthood.
e) To socialize the youth.

However, if one of the main function of schools is to transmit culture, it follows that the curriculum plan must reflect values of the society. Such values in turn are derived from the various cultures of the society. Curriculum planners must use the detailed analysis of the values of the society and decide how such values affect curriculum planning. In a country such as Nigeria with multicultural setting, it becomes very vital for curriculum workers to decide which values must be respected in the process of curriculum planning for multi-cultural settings like Nigeria.

Society has its advantage in many forces that support traditions and reject change. The main advantage is legal authority. The second is the generally agreed upon values of what is right and wrong. The third is that, society has support of tradition in the psychological resistance to change. Human beings resist change in certain aspects or areas of their lives so much so that they would rather die than change their positions.

The society influences action for curriculum planning by bringing pressure on curriculum planners to reflect the curriculum aspects of changes that have occurred in the wider society. Thus in considering all these factors the curriculum planner must do the following:

i. The curriculum workers in Nigeria must consider the feelings of Nigerians as to what they need in the curriculum. If consideration of the demands of society and culture are worthwhile, the curriculum planner must embrace specific cultures that are good and then see that these cultural values are strengthened in the curriculum.

ii. Curriculum planner must also take direct responsibility for channeling social and cultural change meaningfully in the curriculum. They have the responsibility to relate the social and cultural heritage in the elementary and secondary school curriculum in ways which will benefit children for whom they design the curriculum.

iii. They must maintain dialogues with members of the larger society. The function of the curriculum planner is such that he listens to as well as information's from his audience.

iv. They must be open-minded about such society and culture-based influences on the curriculum.

Ways in which society and culture can influence curriculum planning and implementation are:

i. By influencing school rules and regulations.
ii. By influencing teacher/students relationship
iii. By influencing course scheduling or time spent in schools.

In Nigeria today there are not currently as many community schools and private schools and voluntary agency institutions in operation. However, with the recent emphasis on day secondary schools in Nigeria, it is likely that the local community will be asked to play a more important role in curriculum decision for the community.

According to Brown and et al (1982) when parents or guardians live close to their children's school, they tend to take more active interest in the day to day affairs to the school. They can organize fund raising activities to help buy need equipments, building of laboratories or to put up an extra classroom.

Contractors and businessmen can help the school by supplying materials at cost price, which they are likely to do if they know that their children are going to benefit from the school sited in their locality. Parents who work in nearby factories, cooperative farms, water pumping and purification plants can help to arrange field trips for students. school sports terms are likely to have greater support in terms of funding from parents in local and state competitions when parents do not have to travel far to watch their children participating in competitions. Professional people from the community can be invited to talk to the student about their works in school and career guidance. Traditional rulers can also be invited to give a talk or detailed history of the area of their jurisdiction.

When the local community participates in any of the ways outlined above they are in fact participating in and contributing in building the curriculum. Another important contribution the local community can make is through forming Parents-Teachers Association (PTA). In most cases, this will help the school authorities running the day to day affairs of the school. This will mean developing a good relationship with the people of the area, and gaining their cooperation and respect. The P.T.A can also help in developing sport facilities, purchasing of books for the library, acquiring computers for the school and can even sometimes recruit and pay teachers from the P.T.A account. According to Buba (2007) the community in which the school is located in many senses is an artificial reproduction of the conflicts and stresses of the larger society. Hence the child passing through the school curricula has to be educated in attitude development as well as trained in the skills of social interaction, discussion, compromise and mediation of the larger society.

Challenges of Curriculum in Nigerian Education System

According to N.E.R.D.C (2004) some of the teething curriculum issues in Nigerian educational system include the following:

1. The issue of reference of the curriculum to the goals, aspirations and needs of the society has remained largely unresolved.

2. Curriculum content is continually expanding and becoming overloaded as a result of additions and integration of new materials.

3. The interests and needs of learners and of the society at large are changing with times forcing the curriculum also to adopt changes.

4. Curriculum review, revision and adaptation are lagging behind and need to be considered as priorities.

5. Integration and infusion of global issues and concerns such as HIV/AIDS, environmental degradation, drug abuse and population explosion, into the curriculum continue to pose serious challenges to curriculum developers, as well as to school textbook writers and publishers in Nigeria.

6. Large class sizes and overcrowded school time tables pose serious problems to curriculum implementation in Nigeria.

7. The possibilities of learning without teachers loan higher in our educational system today.

8. The quantity and quality of teachers produced over years have fallen short of national expectations and needs.

9. Curriculum assessment and evaluation are bedeviled by massive examination malpractices and fraud, aided by such domestic trauma as drug abuse and cultism in our schools.

10. Teachers require help to successfully mediate the new curricula, the new attitude towards learning the new technologies.

Conclusion

Curriculum is all the planned activities that we organize in order to promote learning, and personal growth and development. In Nigeria the teaching profession is not a respected and lucrative one. Even some of those who are already professional teachers prefer to join other professions. Worse still, every failed applicant in Nigeria resort to teaching when unable to find other gainful employment just anybody can teach.

The problems of teachers who implement the curriculum do not end there. One of the biggest challenges facing teachers' today lies as already mentioned earlier in this paper as coping with an ever-growing class size, a busy school timetable and the increasing variety of subject matter contents, skill, techniques, machinery/equipments, information/communication technologies, evaluation procedures, including continuous assessment and public examinations, examination malpractices, not to mention drug abuse and cultism in our higher institutions.

If there is any profession that requires public sympathy, understanding and help in Nigeria today, it is the teaching profession without which, all the big plans we have for our curricula will never see the day light.

Recommendation

For teachers to cope with the myriad of social, economic and financial constraints as well as the numerous curricular, pedagogic and psychological problems;

1. Both the government and the citizens need to show greater understanding of the plight of teachers from primary to university level.
2. Compassionate attention needs to be paid to teacher's demands for recognitions and respect for the profession.
3. Enacting and implementing favorable conditions of service for teachers through the teacher's salary structure (T.S.S); staff development i.e. training and retraining of teachers particularly about new information, knowledge and skills.
4. The Nigerian society must be prepared for better funding of education to guarantee adequate infrastructure, school materials, supply of equipments to the laboratories and workshops.
5. Better conditions of service, remuneration, job mobility and promotion.
6. Finally the society must ensure confidence building measures in the teaching profession, such as certifying and recertifying teacher periodically after a mandatory period of teaching in the schools.

It has been well established that no curriculum succeeds if the classroom teachers do not approach it from the standpoint of knowledge and enthusiasm.

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ASSESSMENT OF MATHEMATICS TEACHER FACTORS TOWARDS THE USE OF WEB-BASED RESOURCES FOR TEACHING IN SECONDARY SCHOOLS IN NIGER STATE

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Abstract
The study investigated the assessment of Mathematics teacher's factors, towards the use of web – based resources for teaching in secondary schools in Niger State. The research design adopted for this study was descriptive survey research design. The target population of study was all Mathematics teachers in senior secondary schools in Niger State. Random sampling technique was used to select 285 teachers across the three senatorial districts in Niger State. The instrument for the data collection were: PWBR and AWBR, the instruments were validated by experts in the field of Psychology. A pilot test was conducted to determine the reliability of the instruments. Data collected was analyzed using crombach alpha formula and coefficient index of 0.72 and 0.74 was obtained. Findings from the data analysis of the experimental groups (male /female on perception), are $\bar{X}$ *=33.56, SD = 9.57 and* $\bar{X}$ *= 36.88, SD = 7.35 respectively at F(1,283) =2.92, where P=0.03 showed a significant difference between rural and urban secondary school teachers towards the use of web-based resources since 0.01□0.05. But for the (male/female on attitude), are* $\bar{X}$ *=32.65, SD = 8.75 and* $\bar{X}$ *= 34.43, SD = 8.01 respectively at F(1,283) =1.65, where P=0.35 showed no significant difference between rural and urban secondary school teachers' attitude towards the use of web-based resources since 0.45□0.0. It therefore means that, both male and female secondary school, Mathematics teachers have positive perceptions and not attitude towards the use of web based resources. Based on the findings it was recommended among others that Stakeholders in secondary schools should provide necessary ICT devices that can accommodate web based resources for the teaching and learning of Mathematics in the secondary schools and there is a need for periodic seminar and orientation on the use of web based resources for the teaching and learning of Mathematics in the secondary schools so as to change the attitude of these teachers.*

Introduction

The Litmus test for identifying any rapidly developing or changing society is the explosion in the sphere of technology advancement. The increasing acquisition of accessible technologies and the chief among which is computer has served as a major avenue for advancements in developing nations, in homes, schools and workplace. According to Aubert (2007), Computers, provide learners with a veritable means to transmit, access and interpret enormous and increasing body of information and Communication Technology (ICT) not divide. The global acceptance of the use of Information Communication Technology (ICT) in industrialized communities associated with amount of information about technology calls for greater responsibility on schools to assist learners to be more efficient at accessing, transmitting and using large amount of information daily endeavors (Robin, 2011). The use of computers and the internet have become integral part of today's classroom. Moreover, the internet has

facilitated the development of web-based learning for students' learning and assessment across various disciplines. .
Many scholars have advocated for the increasing utilization of new technologies in the schools based on the fact that the students need to be technologically literate to survive and live effectively in the twenty –first century, (Che-Hung, Pai-Lu, Wen-Hsuing, Chun-Yu, Hsiao-Moi & Yu-Li, 2010). This literacy is best achieved in classroom environment where technology becomes the central part of the classroom and where they are used as tool for learning and solving problems (Michael & John, 2008). Quite a number of scholars and educators have lent support to increasing technology usage in schools. This is clearly based on the assertion that for any nation to obtain the status of self-reliance, science and technology must be a core component of the knowledge to be impacted to all the citizens of the nation irrespective of race, creed or sex especially on web based learning (Nsofor, 2001 & 2010). E-Learning provide integrated environment of various technologies to support diverse educators and learners' needs via the internet. The goal of these tools is to enhance face-to-face instruction and to deliver distance-learning courses. Each of these tools offers similar component, such as course not posting, assignment submissions, quizzes and communication features especially in web base learning.

Web – based learning could be defined as "interactive web – based tools that support learning of a specific concept by amplifying or guiding the cognitive processes of learner", (Akinpar & Bal, 2006). Web-based learning materials emerged as elements on personal Web sites with the proliferation and adoption of the internet in the early to mid-90s. Beyond personal publishing, Web-based teaching materials were often published online as samples and supplement materials by commercial entities experimenting with the World-Wide-Web.

Base on world-wide-based several students today have graduated into ubiquitous access to technology and internet thus referring them as the "Net generation" (Montgomery, 2009). Outside the four corners of the classroom, these learners utilize the web to carry out several activities, meaningful tasks including education, visualizing learning, searching and entertaining themselves (Tapscott, 2008). The classroom environment, technology usage is done spontaneously and overall effect on learning shows that it is very negligible (Roberson, 2003).

Web–based Resources (WBR) also referred to as learning objects, provides quite a numerous number of characteristics that explains possible barriers and support learners learning especially in the subject area of science such as Mathematics (Kay, 2011). Web – based resources provides a lot of adaptive solutions to the challenges that everyday tutors are confronted with viz – de viz the utilization of technology. The platforms are easy to be utilized. Similarly, teachers who are even deficient in adequate knowledge of computer based skills do not have to waste much time toward understanding how to utilize this web – based tools (Kay & Knaack, 2007). A web – based tools have well stated objectives and vivid, narrow focus making it simple to develop adequate lesson notes and integrating methods (Kay *et al.,* 2007). Web – based tools can be accessed via internet. However, over 90% of all the public schools in North America and Europe now have access to internet with high – speed broadband connectivity, but in Nigeria very few public schools (10%) have access to these web – based tools (Barkley, 2010). Research on the use of web – based tools have not been conclusive, under the sphere of secondary schools these researchers includes; (Kay & Knnack, 2007; 2008a; 2008b; 2009a, Love Schibeci, Cummings, Phillips and Lake, (2010) all these have been published within the last five years. Most of the researchers have focused on the attitudes and teachers perception.

Research studies on perception of teachers in web – based learning showed that there were significant gains, sometimes as high as 40% (Akinpar & Bal, 2006, Liv & Bara, 2005, Kay &

Knaack 2009a). However, it is not obvious from their studies what types of knowledge has been gained. It is not known whether the learners were acquiring basic or higher level skills as a result of using WBL by the teachers (Nurni & Jaakola, 2006).

Several research studies have also been conducted on web-based practice such as; Deim and Herald (2005) who found that web-based group performed significantly better than the paper and pencil group on both fraction and decimal operation at the end of the study. Web-based practice can create different learning and assessment contexts, and produce flexible approaches to instruction and evaluation. Several studies have shown that student who used web-based learning and practice find Mathematics more enjoyable, achieved, interesting and motivating. The web-based practice can offer a distinctive opportunity to enhance students' achievement and interest when learning and practices are embedded into a cohesive curriculum.

According to (Simon, 2015), by leveraging the instructional potential: of web-based resource, you can increase student's engagement, expose them to authentic content, and engage them in collaborative activities that trigger critical thinking and creativity. Web-based resources have the potential to support a learning environment in which students explore knowledge and enhance their learning (Combes, & Valli, 2007). In addition, the web makes possible interactive resources encouraging student involvement (Sheard, J Sterna, & Markham, 2000). Therefore, with the use of these web-based resources, students can explore their curiosity independently and improve students' mathematics learning, achievement and learning motivation. The web has a wealth of educational information across different topics, which can potentially be used to improve teaching (Chakraborty, Kanthamani, & Subramanian, 2012). They can provide teachers and learners with a wide range of new and exciting experiences that are not possible in a traditional classroom (Hadjerrouit, 2010).

The perception of the teachers is one of the key factors to this study, therefore, it is imperative to understand that the perception of teachers can shape their actions towards the method of delivering their teaching through the use of Web based blended learning. Perception refers to the extent of believe of people that the utilization of a particular material or object will enhance teaching of a given or a particular concept (Ertmer, Gopalakrishnan & Ross, 2001). The belief is that the use of Web based blended learning will improve the teaching pedagogy of teachers and it will also help to broaden the knowledge of teachers as well as that of students about the concept. The perception of people, especially teachers towards the utilization of any material will affect their level of interaction and acceptance of the material (Folarin, 2016). This implies that having a positive perception about the utilization of Web based blended learning among secondary teachers can add values to their method of teaching and consequently, their adoption, which will also be of benefits to the learners in line with teachers' attitude.

Teachers attitude is a key factor for a proper implementation of web based blended learning and one of the main reason to differentiate weather web based learning is efficient or not (Hadjerrouit, 2010). Since its only teacher who adopts a positive attitude can be promoted and used in their classes towards the use of innovative teaching technologies, especially web based resources (Deveck, 2012). It seems necessary important for teachers to know how to implement web based resources in their subjects.

Mathematics is no doubt a course of discipline which is widely used in all spheres of human endeavor and it has gained wide recognition in the contemporary activities globally.

Many factors have been identified as the major reasons why student hate Mathematics or failed Mathematics this includes the way Mathematics is taught in a rather abstract manner by teachers (Nekany, 2007). Agbor – Etang sited in Nekang (2004) noted that the problems in teaching sciences especially mathematics is traced to the teaching methodology used. He added that these problems metamorphosed to affecting both the future professional Mathematicians and also of similar concern to the physicist, statisticians, engineers, economist and sociologists.

Gender issue in learning has been of great concern to the educators. Torto (2013) results showed that the success rate of females was lower than the males. Harbor – Peters (2001) opined that boys have some features which favour their higher achievement and interests in Mathematics than girls. He further stressed that gender issue in Mathematics has been a source of concern. Mathematics has been male – stereotyped because it has been observed to be abstract and difficult and having characteristics which boys are lured to. However, contrary to the above – some researches have debunked the myth that Mathematics is a subject suitable for boys only they observed that male and female students taught by the professional Mathematics tutors benefited equally (Nekang & Agwagal, 2010).

It is based on the above premises that the research study aimed at Assessing of Mathematics Teacher Factors Towards the Use of Web-Based Resources for Teaching in Secondary Schools in Niger State.

Web based resources can be considered as key intellectual property in a competitive learning environment. Although WBR exist (Ygci, Sirakaya and Ozudogu, 2015; Osguthoorpe and Graham, 2014 and Longe, 2010) research evidence shows that they are being used to enhance teaching among teachers. Presently, web based learning access Are few and there are untrained or lack of trained teachers in secondary schools, but teachers in Nigeria or Niger State in particular have not been using it. More preference has been given to the use of outdated methods such as, discussion, lecture, fieldtrip, project method among others. Interestingly, few online or web based strategy has been used at secondary school level and the resulting perception and attitude to their uses has been inconclusive. Based on the above, the study therefore: intends at Assessing of Mathematics Teacher Factors Towards the Use of Web-Based Resources for Teaching in Secondary Schools in Niger State.

Objectives

The research work has the following objectives. To;

1. Examine gender influence of secondary schools Mathematics teachers perception towards the use of web based resource in Niger State.
2. Examine gender influence of secondary schools Mathematics teachers attitude towards the use of web based resources in Niger State.

Research Questions

The following research questions were raised to guide the study

1. How does gender influence secondary schools Mathematics teachers perception towards the use of web Based resources in Niger State?
2. How does gender influence secondary schools Mathematics teachers attitude towards the use of web based resource in Niger State?

Research Hypotheses

The following hypothesis were formulated to guide the study and tested at 0.05 level of significance.

HO_1: There is no significant difference between the male and female secondary schools Mathematics teacher's perception towards the use of Web based resources in Niger State.

HO_2: There is no significant difference between secondary schools Mathematics teacher's attitude towards the use of Web based resources in male and female in Niger State.

Methodology

The research design adopted for this study was a descriptive survey research design. According to Best (2017), is a scientific method which involves observing and describing the behaviour of a subject without influence. It is suitable to use survey type of research design. The descriptive survey design is used to describe the distinctiveness of individual or group, the relationship that exist between variables which includes assessment of Mathematics teachers perception and attitude towards the use of web-based resources.

The target population was all the Mathematics teachers in senior secondary schools totaling 1,063 in the 486 secondary schools in Niger State. The population shares the same characteristics such as enumeration, environment, syllabus among other.

The sample of the study consisted of 285 secondary school Mathematics teachers that were drawn from the participating schools. The schools were randomly selected from the three senatorial districts of Niger State. The sample selected was representative of the entire population of Mathematics teachers in senior secondary schools in Niger State.

The research instrument that was used in this study to collect the data was a questionnaire and it was designed by the researcher. The questionnaire was titled "Mathematics Teachers Perception and Attitude towards the use of Web-Based Resources Questionnaire (WBRQ)". The questionnaire was divided into three Section (Sections A, B, C,); section A, was used to elicit responses on the demographic data of the respondents. Section B, consists of ten items designed to elicit data on respondents' perception of web-based resources (WBRQ). Section C, consists of items tailored to generate data on Mathematics Teacher's Attitude towards WBRQ. Section B of WBRQ is LIKERT scale of WBRQ: Extremely Important (EI), Moderately Important (MI), Strongly Agreed (SA), Slightly Important (SI) and Not Important (NI). Which were coded 5, 4, 3, 2 and 1 point respectively. Similarly, Section C is a LIKERT scale of: Strongly Agee (SA), Agree (A), Undecided (U), Disagree (D) and Strongly Disagree (SD), and were coded 5, 4, 3, 2 and 1 point respectively.

The instrument was validated by two lecturers, all from the Department of Educational Technology, Federal University of Technology Minna, for face and content validity. The validators were requested to validate the items on suitability, clarity, logical arrangement of the items among others. Their suggestions and recommendations were taken into consideration in the production of the final draft of the instrument (see appendix B). Similarly, since the questionnaire is psychologically based, it was also validated by a psychologist and ICT Expert in C.O.E Minna Niger State.

A pilot test was conducted to test the reliability of the instrument. A total number of 20 Mathematics teachers from selected secondary schools in Niger State which is part of the population and not part of the study. The questionnaires were distributed and retrieved by the researcher. The administration was done and a reliability coefficient of r=0.75 and 0.72 from the variable perception and Attitude was obtained respectively using Cronbach"s Alpha. Based on the coefficient index obtained, the instrument was considered reliable. (See appendix C)

Permission was obtained from the Management of the sampled secondary schools to get approval in order to sample Mathematics Teachers. The participants were be briefed on the objectives of the study; researcher and the research assistants administer the questionnaire on the sampled teachers. The sampled questionnaire was collected immediately after they have been filled within a giving duration after weeks of administration procedures the data was sorted, coded and analyzed.

The data gathered from the sampled teachers was analysed using descriptive statistics. The descriptive statistics provided answers to the research questions using mean and Standard Deviation. t-test analysis was used to test research hypotheses; the significant difference was ascertained at alpha level of 0.05. The Statistical Package for Social Science (SPSS Version 23) was used for the analysis.

Results

Research Question One: How does gender influence secondary schools Mathematics teachers perception towards the use of web Based resources in Niger State?

Table 1: Mean and Standard Deviation Male and Female secondary schools Mathematics teachers' perception towards the use of web based resource in Niger State

	GENDER	N	Mean	SD
Q1	MALE	193	3.52	1.458
	FEMALE	92	3.98	1.167
Q2	MALE	193	3.12	1.398
	FEMALE	92	3.51	1.181
Q3	MALE	193	3.26	1.325
	FEMALE	92	3.64	1.105
Q4	MALE	193	3.37	1.364
	FEMALE	92	3.66	1.260
Q5	MALE	193	3.38	1.310
	FEMALE	92	3.87	1.121
Q6	MALE	193	3.37	1.277
	FEMALE	92	3.57	1.161
Q7	MALE	193	3.42	1.305
	FEMALE	92	3.78	1.108
Q8	MALE	193	3.31	1.235
	FEMALE	92	3.64	1.075
Q9	MALE	193	3.42	1.297
	FEMALE	92	3.65	1.133
Q10	MALE	193	3.40	1.292
	FEMALE	92	3.58	1.141
	Male Grand Mean		**3.36**	
	Female Grand Mean		**3.69**	

Decision Mean = 3.00

The Table 4.3 shows male and female of perception secondary schools Mathematics teachers' perception towards the use of web Based resources. This indicates that all the items in both male and female scored more than 3.0 decision mean, that is male grand mean score is 3.36 and female grand mean score is also 3.69 which imply that all the items were accepted which translate to perception towards the use of web Based resources in Niger State. Based on the results of analysis of research question three. The implication is that, there is no disparity between male and female perception on the use of web Based resources.

Research Two: How does gender influence secondary schools Mathematics teachers' attitude towards the use of web based resource in Niger State?

Table 2: Mean and Standard Deviation of Male and Female secondary schools Mathematics teachers Attitude towards the use of web based resource in Niger State

	GENDER	N	Mean	SD
Q1	MALE	193	3.27	1.355
	FEMALE	92	3.49	1.288
Q2	MALE	193	3.23	1.288
	FEMALE	92	3.39	1.249
Q3	MALE	193	3.28	1.301
	FEMALE	92	3.35	1.253
Q4	MALE	193	3.47	1.303
	FEMALE	92	3.68	1.195
Q5	MALE	193	3.33	1.201
	FEMALE	92	3.54	1.199
Q6	MALE	193	3.33	1.308
	FEMALE	92	3.61	1.204
Q7	MALE	193	3.36	1.284
	FEMALE	92	3.50	1.245
Q8	MALE	193	3.12	1.275
	FEMALE	92	3.38	1.194
Q9	MALE	193	3.22	1.390
	FEMALE	92	3.13	1.400
Q10	MALE	193	3.05	1.255
	FEMALE	92	3.36	1.314
	Male Grand Mean		**3.27**	
	Female Grand Mean		**3.44**	

Decision Mean = 3.00

The Table 4.4 shows male and female of secondary schools Mathematics teachers' attitude towards the use of web based resource in Niger State. This indicates that all the items in both male and female scored more than 3.0 decision mean, that is male grand mean score is 3.27 and female grand mean score is also 3.44 which imply that all the items were accepted which translate to positive attitude towards the use of web Based resources in Niger State. Based on the results of analysis of research question four. The implication is that, there is no disparity between male and female attitude on the use of web Based resources.

Hypotheses Testing

Hypothesis One: There is no significant difference between the male and female secondary schools Mathematics teacher's perception towards the use of Web based resources in Niger State**.**

Table 1: Shows t-test comparisons of perception rating of male and female towards the use of web based resources

Variable	N	Df	X	Sd	t-Cal	Sig
Male	193	283	33.56	9.57	2.92	0.003
Female	92		36.88	7.35		

S: Significant at p< 0.05 alpha level

The result of the t-test on male and female perception of Mathematics teachers perception towards the use of Web based resources in Niger State as shown in (Table 4.7) revealed a F (1, 283) = 2.92; P=0.003 with this result, the hypothesis was rejected because p-value of 0.003 on the table was lesser than the pre-set level of significant of p<0.05. With this finding, the implication is that there was significant difference between the male and female secondary schools Mathematics teacher's perception towards the use of Web based resources in Niger State

Hypothesis Two: There is no significant difference between secondary schools Mathematics teacher's attitude towards the use of Web based resources in male and female in Niger State.

Table 2: Shows t-test comparisons of attitude rating of male and female towards the use of Web based resources.

Variable	N	Df	X	Sd	t-Cal	Sig
Male	193	283	32.65	8.75	1.65	0.35
Female	92		34.43	8.01		

NS: Not Significant at p>0.05

The result of the t-test on male and female perception of mathematics teacher towards the use of Web based resources in Niger State as shown in (Table 4.9) revealed a f (1, 283) = 1.65; P=0.35 with this result, the hypothesis was accepted because p-value of 0.35 on the table was lesser than the pre-set level of significant of p>0.05 With this finding. The implication is that there was no significant difference between the male and female secondary schools Mathematics teacher's attitude towards the use of Web based resources in Niger State

Findings of the Study

1. There was significant difference between the male and female secondary schools Mathematics teacher's perception towards the use of Web based resources in Niger State**.**

2. There was no significant difference between the male and female secondary schools Mathematics teacher's perception towards the use of Web based resources in Niger State

Discussion of Results

There was significant difference between the male and female secondary schools Mathematics teacher's perception towards the use of Web based resources in Niger State. This is in agreement with the findings of Yanti (2017) conducted a research to assess the students' perception of difficult topics in Mathematics in some selected senior secondary schools (SS) in Kano State Nigeria. It was show that gender had a significant influence on their perception of difficult topics in Mathematics. Also in concord with findings of Michael *et al* (2016) who carried out research on perceived usefulness, perceived ease of use and gender on social media adoption among university students in Ghana.

There was no significant difference between the male and female secondary schools Mathematics teacher's attitude towards the use of Web based resources in Niger State. This is in agreement with Ogunlade *et al* (2016) who carried out study to examined University stakeholders' (academic and technical staff) attitude towards the use of E-tutoring for distance learning in Nigeria. The result revealed that there is no significant difference between male and female academic and technical staff attitude toward the use of E-tutoring for distance learning in Nigeria. Also it is in agreement with the work of Falode, Usman, Ilobeneke., Mohammed., Godwin & Jimoh, (2016) who investigated effectiveness of computer simulation instruction on the attitude of Geography students towards map reading. The results indicated that there was no significant difference between the attitude of male and female students exposed to the package.

Conclusion

From the findings of this study, it is concluded that both male female secondary school Mathematics teacher's have positive perception towards the use of Web based resources. From the findings of this study, it is concluded that both male female secondary school Mathematics teachers has positive attitude towards the use of Web based resources.

Recommendations

Based on the findings that emanated from this study, the following recommendations were made:

1. Stakeholders in secondary schools should provides necessary ICT devices that can accommodate web based resources for the teaching and learning of Mathematics in the secondary schools
2. There is a need for periodic seminar and orientation on the use of web based resources for the teaching and learning of Mathematics in the secondary schools.

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TEACHING-LEARNING-BASED OPTIMIZATION (TLBO) ALGORITHM FOR ENHANCED CURRICULUM EVALUATION: A FEASIBILITY STUDY

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Abstract
In this paper, a feasibility study towards the development of a curriculum evaluation model using Teaching-Learning-Based Optimization (TLBO) was presented. Based on the successes of Computation Intelligence techniques, especially the metaheuristic optimization algorithms in solving complex optimization problems, the application of TLBO for curriculum evaluation was proposed. The teacher-learner process of the algorithm and its performance evaluation function will be harnessed to evaluate the effectiveness of a curriculum. When developed, the algorithm is expected to enhance curriculum development process.

Keyword: Curriculum; Curriculum Evaluation; Computation intelligence; Metaheuristic Optimization Algorithms; Teaching-Learning-Based Optimization

Introduction
Curriculum has been defined as "all the learning which is planned and guided by the school, whether it is carried on in groups or individually, inside or outside the school" (Hassan, 2013). Curriculum can also be viewed as a the practical activities carried out by teachers in order to pass knowledge to learners, or as knowledge that is needed to be transferred or the process of knowledge transfer (Hassan, 2013). Curriculum has been viewed as the set of courses that are intended to deliver knowledge, values, principles and skills which are consequences of formal education (William & William, 1993). Another view is that curriculum is "what is taught" (Arthur, 1981) while it is viewed as the total active life of each person in college (Harold, 1950). Any curriculum contains an aim, properly arranged contents, guidelines for dealing with the contents, an evaluation system to determine the effectiveness of the curriculum.

Curriculum development is the step-by-step process employed to enhance the courses offered by an educational body such as schools, colleges or universities. The evolving world brings daily changes which must be integrated into the education curricula. Innovative teaching techniques and strategies are constantly being checked in order to improve the student's learning experience. As a result, institution have to be able to put plans in place for acknowledging shifts and then be able to implement them in the school curriculum (Stutt, 2018) . There are two curriculum development models:

a. **The Product Model:** This type of model is result oriented. It focuses mostly on things like grade; it focuses on the results rather than the students learning process (Stutt, 2018).
b. **The Process Model:** This model focuses on the learning process and how it improves overtime (Stutt, 2018).

There are several approaches to curriculum development, one commonly used approach is shown in Figure 1.

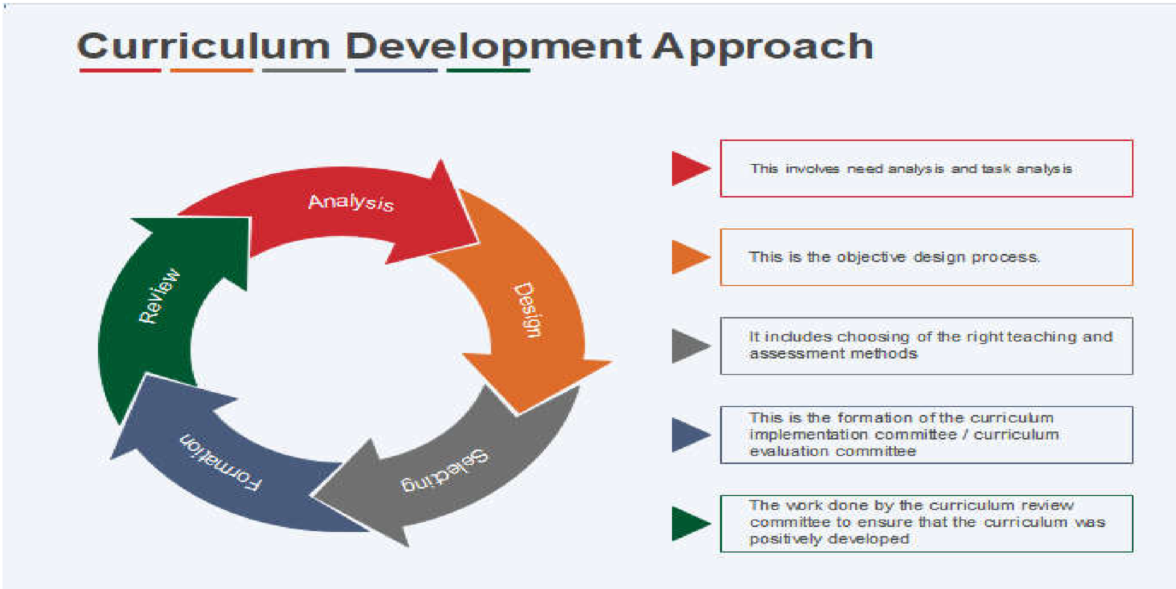

Figure 1; Curriculum development Approach

Curriculum evaluation is an essential part of the whole process of curriculum development. It is a continuous activity and not just performed at the end of the development process. Evaluation essentially is making information available for the sake of influencing decision making at the different stages of curriculum development. This information may involve the whole program or a part of the program. Curriculum evaluation helps in determining the outcome of a program, a programs plausibility, revision of the course/program content and it also gives insight on ways to further develop the course or program. There are three major roles of curriculum evaluation, these are the formative evaluation and summative evaluation. The formative evaluation occurs while the curriculum is being developed while summative evaluation occurs at the end of the evaluation process. Finally, diagnostic evaluation is directed towards two purposes; it can be used to fix students in the correct outset of an instructional level, or to find out the hidden cause of deviancies in student's learning (Farooq, 2018). From these roles of curriculum evaluation, it is evident that to evaluate a curriculum, it has to be administered either during the process or at the end of the process. Improvement and modifications can also be suggested after the initial evaluation process.

This paper proposes the evaluation of a curriculum before it is administered using computational intelligence framework. Computational Intelligence (CI) techniques comprises of algorithms that are inspired by different natural phenomena to solve real-world optimization problems (Xing & Gao, 2013). The curriculum evaluation objective function will be formulated and teaching and learning process will be modelled and simulated. Metaheuristic Optimization Algorithms (MOA) which are one of the most successful CI technique have been successful in solving complex optimization problems (Yang, 2013). One of the key characteristic of population-based MOA is their ability to use multiple search agents which prevent the search agents from getting stuck in local optima. With robust communication among agents inspired by several nature-inspirations, MOA are able balancing between exploitation and exploration which is the key determinant of how successful they are on optimization problem (Abdullahi I. M., Mu'azu, Olaniyi, & Agajo, 2019). MOA are inspired by some nature characteristics like animal behaviors, evolution, ecology and culture, controlled by high level strategies (Bronlee, 2011).

several MOA have been developed to solve several problems optimally, they include; Pastoralist Optimization Algorithm (POA) inspired the nomadic pastoralist herding strategies (Abdullahi I. M., Mu'azu, Olaniyi, & Agajo, 2018), Teaching Learning Based Optimization (TLBO) inspired by teaching-learning process (Rao, Savsani, & Vakharia, 2011) and Imperialist Competitive Algorithm (ICA) inspired by the colonization of empires (Atashpaz-Gargari & Lucas, 2007). MOA are generally classified as Biology-Based Algorithm (BBA), Physics-Based Algorithm (PBA), Chemistry-Based Algorithm (CBA) and Mathematics-Based Algorithm (MBA) (Xing & Gao, 2013.

1. Curriculum Evaluation Models.

Some popular curriculum evaluation models which have been widely applied in educational evaluation include the following (Anh, 2018):

a. Tyler's Objective Model

This model was developed to evaluate student's progress towards some instructional objectives. This was achieved by specifying instructional objectives, collection of performance data and validation of the performance data against the specified objectives. It however ignores process and could not be used to specify the reason a curriculum was not successful (Tyler, 1949).

b. Stake's Responsive Model

Stake's model focuses on responsive evaluation that focuses more on describing and judging audience information. It place less emphasis on results and more emphasis on program activities. This is done by recording antecedents (existing conditions prior to curriculum evaluation), transactions between teachers and students, students and students, students and curriculum material and finally, students and educational environment. Finally, the outcomes are measured (Stake, 2011).

c. Scriven's Goal-Free Model

In Scriven's model, the intended and unintended effects of a curriculum are evaluated based on some set needs or objectives (Scriven, 1974). Scriven's identified two roles curriculum evaluation plays:

i. Formative Evaluation:

A formative type of evaluation judges the curriculum as it is being used. Using a formative evaluation allows check the progress or impact of the curriculum on a consistent basis, instead of waiting until the end of the school year. Examples of formative evaluation include midterm course evaluations or reviewing summaries (Loop, 2017).

ii. Summative Evaluation:

In summative evaluation, the final result of the curriculum are assessed with respect to its stated objectives. It takes place after the curriculum has been fully developed and put into operations (Farooq, 2018).

d. CIPP Model

CIPP model of evaluation focuses on Context, Input, Process and Product (CIPP) of the programme (Stufflebeam, 2014). The model focuses on decision making which include context evaluation (the what?), Input evaluation (the how?), the process evaluation (the who?) and the product evaluation (the outcome?). The model is very sensitive to feedbacks and provide good alternatives, however, it under-values students input and over-values efficiency.

2. Teaching Learning-Based Optimization (TLBO)

TLBO is a nature-inspired population-based MOA that is inspired by the teaching and learning process in a classroom. TLBO mimics the behavior of learners when influence by teachers and the interaction between the learners themselves (Rao, Savsani, & Vakharia, 2011). Being a population-based MOA, a group of learners makes up the population of the algorithm or potential solutions. The variables of the population are represented by the different subjects offered to the learners while the performance of each learner represents the fitness of the optimization problem. TLBO is implemented in two phases:

3.1Teacher Phase

In this phase, the teacher tries to bring the learners to his or her knowledge level by raising the mean level of all the learners towards its own level. The best solution or learner becomes the teacher. Given an N number of learners and D size of the search problem, the position of a learner(X), is represented as: $X = (X_i^1, \dots, X_i^d, \dots, X_N^D)$ where X_i^d is the position of the i[th] learner at the d[th] variable. Let the teacher be represented as (T), and the mean of a class with N learners be represented as:

$$\mu_i = \frac{1}{N}\left(\sum_{i=1}^{N} X_i\right) \tag{1}$$

As the teacher tries to move the mean of the learners from μ towards its own level μ_{new}, the mean difference is given as:

$$\Delta_i = r_i(\mu_{new} - T_F\mu_i) \tag{2}$$

Where, r_i is a random number in the range [0,1] and T_F is the teaching factor that determines the value of mean to be changed. T_F is heuristically varied between 1 and 2 and is calculated from:

$$T_F = round[1 + rand(0,1)\{2-1\}] \tag{3}$$

The new position of the learners are updated according to:

$$X_{new,i} = X_{old,i} + \Delta_i \tag{4}$$

3.2Learner Phase

The learners learns through two processes. First, through the teachers influence and secondly, through the interaction with other learners (Rao, Savsani, & Vakharia, 2011). This is achieved using the pseudocode as shown in Figure 2:

i. ***For** i=1: N*
  Randomly selects two learners X_i and X_j: $i \neq j$
  i. ***If** $f(X_j) > f(X_i)$*
    $X_{new,i} = X_{old,i} + r_i(X_i - X_j)$
  ii. ***Else***
    $X_{new,i} = X_{old,i} + r_i(X_j - X_i)$
  iii. ***End if***
ii. ***End for***
iii. *Accepts X_{new} if it gives a better result*

Figure 2: Learning from Learners Pseudocode

Figure 3 shows the flowchart of the TLBO algorithm where each of the steps taken on the implementation of TLBO was highlighted.

3. Proposed TLBO Curriculum Evaluation Model

In developing the TLBO curriculum evaluation framework, the problem is formulated as an optimization problem where group of students or learners were thought with different curriculum with a view of obtaining the best students or curriculum. The model is shown in Figure 4 and the steps are summarized as follows:

4.1 Problem Formulation

The curriculum evaluation problem is formulated as a maximization optimization problem where the fitness function is defined as:

$$F = \max\left(f\left(X_{i,j} * C_{i,j}\right)\right), \quad (5)$$

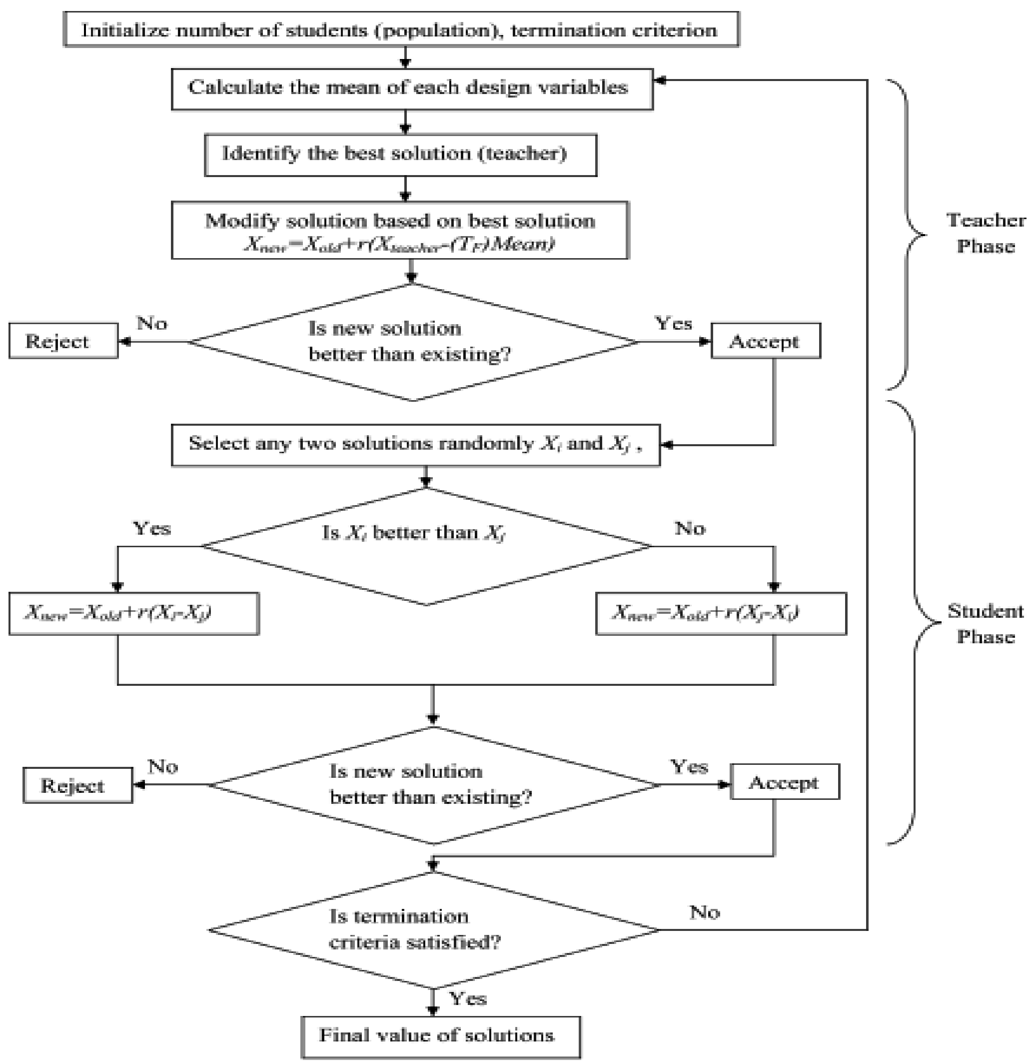

Figure 3: TLBO Flowchart (Rao, Savsani, & Vakharia, 2011)

Subject to:

$$\sum_{j=1}^{M} X_{i,j} = \mathrm{M} \tag{6}$$

$$\mathrm{Q}_{min} \leq \mathrm{C_j} \leq \mathrm{Q}_{max} \tag{7}$$

Where, $\mathrm{i} \in \mathrm{N}, \mathrm{j} \in \mathrm{M},\ C_{i,j} \in \{0, 1\}$, N is the total number of students, M is the number of courses for any considered curriculum, $C_{i,j}$ is the course/subject offered by student i. Equation (6) is the equality constraint that ensures that all students take a maximum of M courses, while Equation (7) is the inequality constraint that ensures that each course is within a minimum and maximum limit for a given curriculum.

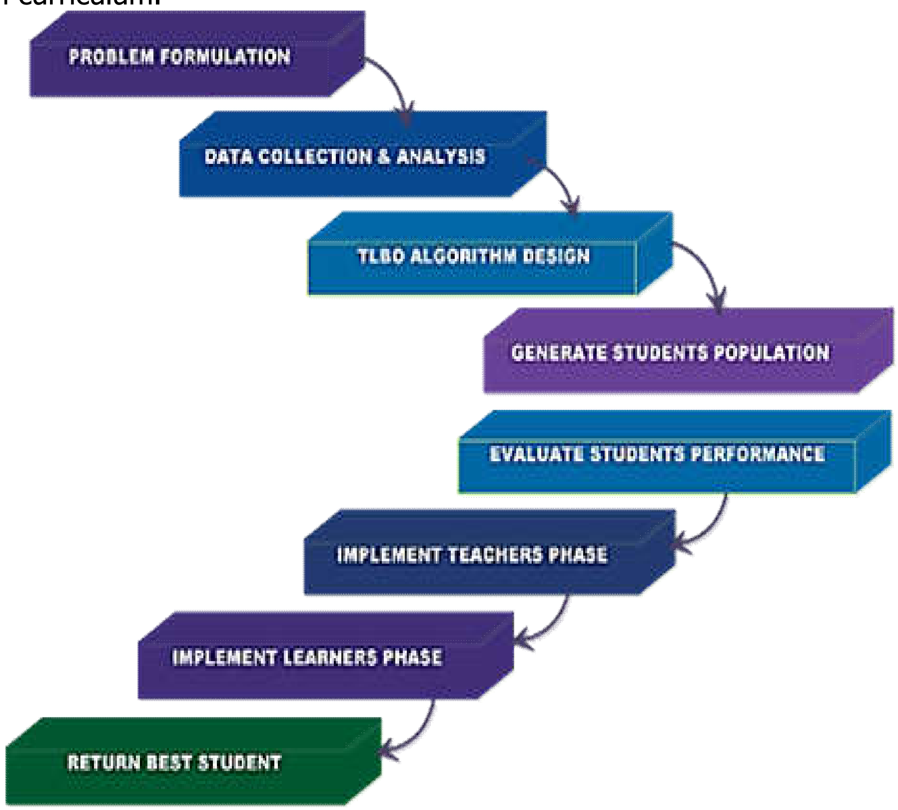

Figure 4: Proposed Curriculum Evaluation Framework

4.2 Data Collection & Analysis

The curriculum of different courses at tertiary level will be collected and used for the experiments. Each curriculum will be analyzed to identify the range of changes it can be subjected to and mapped to their respective expected outcome.

4.3TLBO Algorithm Design

Here, the algorithm parameters like the population size, maximum iteration and other parameters will be set. This parameters act as a control to guide the convergence of the algorithm towards the best solution. This will be followed by generation and evaluation of each student Performance and the implement teachers and learners phases. The global best solution will then be returned as the best curriculum.

Conclusion

In this paper, a feasibility study towards the development of a Teaching-Learning-Based Optimization (TLBO) algorithm for enhanced curriculum evaluation was presented. The teaching-learning process of the algorithm will be modelled to suite a given curriculum evaluation process and in turn evaluates the curriculum effectiveness. Different students will be thought with different curriculum and the fitness function will be used to evaluate the fitness of each student. This will likely help in obtaining the best curriculum.

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INVESTIGATION INTO THE LEVEL OF AWARENESS AND COMPLIANCE WITH ROAD SIGNS AMONG DRIVERS IN ABUJA METROPOLIS

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Abstract
This study was carried out to investigate the level of awareness and compliance with road signs among drivers in Abuja metropolis. The study investigates the: level of awareness of road signs among drivers, level of compliance with road signs and other safety devices and the constraints affecting the effective utilization of road signs and other safety devices among drivers. Three research questions were answered and two null hypotheses were formulated and tested at 0.05 levels of significance guided the study. The descriptive survey design was used and the target population for this study was made up of the Federal Road Safety Corp (FRSC) and motor vehicle Drivers in Abuja Metropolis. The instrument used for data collection was a structured questionnaire. The questionnaire was subjected to face and content validation by three experts in Automobile Technology. Cronbach Alpha statistics was used to determine the reliability coefficient of the questionnaire and it was found to be 0.86. The data collected from the respondents were analyzed using mean, standard deviation and t-test statistics. The finding on the levels of awareness of road signs among drivers include among others: Y-Junction, Narrow Bridge Ahead, Give Way to Traffic, T-Junction, Speed Limit. Findings related to the level of compliance and other safety devices revealed among others, that the drivers complied with the following road signs: No Parking and No Left Turn. Findings that are related to the constraints affecting effective utilization of road signs include among others: Illiteracy, drunkenness, improper orientation, road congestion. Based on the findings, it was recommended among others that, training and re-training, as well as periodic road safety education, should be organized for drivers by the government and other nongovernmental organizations to ensure that they are familiar with road signs and other safety practices on the road motor vehicle.

Keywords: Compliance, Drivers, Level of Awareness and Road Signs

Introduction
Movement is indispensable and compulsory for all human activities in search of basic needs of life and in carrying out day-to-day activities. The movement of people, goods and services from one destination to another has in essence been part of human civilization and development. Prior to the advent of civilization, animals such as cattle, camels, horses were used prominently as a means of transportation; but with the advent of modernization, came with the evolution of modern means of transportation such as the air, water, rail transport system and the most widely used is the road transport system.

Road transport is a form of land transport which involves the movement of people and goods by motor cars, trucks, buses, motorcycles, bicycles among others. In Nigeria, road transportation is the most dominant because more than 90% of Nigerians make use of the road as compare to the other means of transportation (Ladan, 2011). However, in the course of transportation, there exist some unavoidable negative consequences in which accident is one.

Accident is also known as the Road Traffic Accident (RTA) is an unpleasant event that happens unexpectedly which result in bodily injury, damage of properties, loss of body parts and even loss of lives. In Nigeria, the rate of road traffic accident is worrisome due to some factors such as the state of unsoundness of the roads, lack of caution of road safety devices, road signs and markings from drivers and riders. The RTA is, therefore, an issue of great international concern as it has emerged as the single greatest source of death all over the world (Adeile, 2011). Studies revealed that RTAs in developing countries cost almost one per cent (1%) of these countries Gross National Product (GNP) (Akpoghomeh, 1998). According to Idris and Mustapha (2019), RTAs have claimed more lives than deaths resulting from all communicable diseases put together including the Acquired Immune Deficiency Syndrome (AIDS). Thus, the government and people of Nigeria are deeply concerned about the continuing high rate of road accidents and the unnecessary consequential waste of lives and properties. What is worrisome is the fact that RTA and mortality are still at an alarming rate despite various remedial measures taken in recent years to combat the problem. In fact, the Nigeria accident pattern seems to suggest that the better the roads, the higher the accident and fatality rate as well as the severity and non-survival indices because of driver non-compliance with speed limits (Filani & Gbadamosi, 2007).

The attempt to reduce the number and severity of road crashes necessitated the formulation of Road Traffic Signs (RTS). The RTS are conventional symbols used on the road to know about traffic regulations such as special hazards and other road conditions, construction areas speed limits (Idris & Mustapha, 2019). Idris and Mustapha (2019) also highlighted that the driver should not only be familiar with each of the signs but to also recognize the special shapes and colours. The signs are:

1. Regulatory (Prohibitive) Signs: These are information telling us about what we are not supposed to do on the road. These signs are mostly circular in shape and are red and yellow circles.

2. Regulatory (Mandatory) Signs: These are information telling us about what we are supposed to do on the road. These signs are mostly circular in shape and are with blue circles, but no red border.

3. Informative Signs: These are information telling us about important places of help or assistance ahead of us. These signs are usually rectangular in shape and provide guidance information.

4. Warning Signs: These are information telling us about dangers ahead of us on the road. These signs are usually triangular in shape, with a red perimeter. The only warning sign with an inverted triangle means "YIELD" or "Give Way".

Most major township roads in Nigeria are well tarred with road signs to guide the users on the use of the roads and to maintain safety. It is noted, however, that in spite of the road signs that are visible on the roads, accidents still occur due to violation of the traffic rules as represented by the signs. This incessant road mishap calls for serious questions on the effectiveness of the road signs as a vehicle of information dissemination to the road users. The above facts underscore the importance of investigation into the level of awareness and compliance with road signs among drivers in Abuja metropolis. Specifically, the study sought to determine:

- The level of awareness of road signs by motor vehicle drivers
- The level of compliance with road signs and other safety devices by motor vehicle drivers
- The constraints affecting the compliance of road signs by motor vehicle drivers

Research Questions

The following research questions guided the study

- What is the level of awareness of road signs among drivers?
- What is the level of compliance with road signs and other safety devices?
- What are the constraints affecting the effective utilization of road signs and other safety devices among drivers?

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance.

$H0_1$: There is no significant difference in the mean responses of the drivers and officials of Federal Road Safety Corps with respect to the level of awareness of road sign.

$H0_2$: There is no significant difference in the mean responses of FRSC officials and drivers with respect to the level of compliance with road signs and other safety devices.

Methodology

A descriptive survey was adopted for the Study. The study employed the use of questionnaires to determine the views of the respondents on the level of awareness and compliance with road signs towards accident reduction in Abuja metropolis. Abuja was selected because of the presence of high traffic influx and its demographic attributes. The targeted population for this study was 60 respondents, comprising 15 officials of the Federal Road Safety Corps (FRSC) and 45 motor vehicle Drivers in FCT, Abuja. Since the population is of manageable size, the entire population was studied, hence no sampling technique was employed for the study. The instrument used for the data collection was a structured questionnaire which comprises of 44 items. These include 15 items dealing with the level of awareness of road signs among motor vehicle drivers; 15 items dealing with the level of compliance with road signs and other safety device and 14 items regarding the constraints affecting compliance of road signs. A four-point rating scale was adopted for the study. These include Highly Aware (HA) = 4, Aware (A) = 3, Moderately Aware (MA) = 2, Not Aware (NA) = 1 for research question one. Also, for research question two, the response options were: Highly Comply (HC) = 4, Comply (C) = 3, Moderately Comply (MC) = 2, Not Comply (NC) =1 while for research question three, the response were: Strongly Agree (SA) = 4, Agree (A) =3, Disagree (D) =2, Strongly Disagree (SD) = 1. To ensure the validity of the instrument three validates in the field of Automobile Technology validated the instrument. This is to ensure that the instrument was capable of eliciting the essential information needed for the study. The reliability of the instrument was established using Cronbach Alpha (α) to determine the internal consistency of the instrument. The reliability coefficient was found to be 0.86. The data collected was analyzed using mean, standard deviation and t-test statistics. The mean and standard deviation were used to answer the research questions while t-test statistics was used to test the null hypotheses. To determine the acceptance level of each item, a mean score of 2.50 was used as the cutoff point. Therefore, any item with a mean score of 2.50 and above was considered aware, compiled and agreed in research question one, two and three respectively and any item with a mean of 2.49 and below was considered not aware, not complied and disagreed respectively.

Results

Research Question 1

What are the levels of awareness of road signs by motor vehicle drivers?

Table 1: Mean Responses of FRSC Officials and Drivers on the level of awareness of road signs among drivers

N_1=15, N_2=45

S/N	ITEM				Remark
1.	Y-Junction	3.50	3.34	3.42	Aware
2.	Dangerous double bend (First to Left)	3.77	3.97	3.87	Aware
3.	Narrow Bridge Ahead	3.43	3.37	3.40	Aware
4.	Give Way to Traffic	3.50	3.92	3.71	Aware
5.	Cross Road Four-Way Junction	3.50	3.94	3.72	Aware
6.	T-Junction	2.90	2.97	2.94	Aware
7.	Dangerous bend Right	3.37	3.90	3.64	Aware
8.	Round About	2.70	3.01	2.86	Aware
9.	No Right Turn	2.70	2.92	2.81	Aware
10.	No Parking	2.57	2.77	2.67	Aware
11.	No Left Turn	2.63	2.92	2.78	Aware
12.	No U-Turn	2.63	2.86	2.75	Aware
13.	Traffic Light	3.03	2.77	2.90	Aware
14.	No Horn	4.03	4.37	4.20	Aware
15.	Speed Limit	3.70	3.08	3.39	Aware

Keys: X_1 = Mean of FRSC Officials; X_2 = Mean of Drivers; X_T = Average of Mean of FRSC Officials and Drivers, obtained by; N_1 = Number of FRSC Officials; N_2 = Number of Drivers.

Table 1 revealed that the respondents all agreed with the items with a mean score above 2.50. That implies that the respondents are aware of all the road signs.

Research Question 2
What are the levels of compliance with signs and other safety devices?

Table 2: Mean Responses of FRSC Officials and Drivers on the level of compliance with signs and other safety devices

S/N	ITEM				REMARK
1.	Y-Junction	3.97	3.34	3.66	Complied
2.	Dangerous double bend (First to Left)	4.63	3.59	4.11	Complied
3.	Narrow Bridge Ahead	4.10	3.77	3.94	Complied
4.	Give Way to Traffic	4.70	4.08	4.39	Complied
5.	Cross Road Four-Way Junction	4.03	3.79	3.91	Complied
6.	T-Junction	3.63	2.92	3.28	Complied
7.	Dangerous bend Right	3.83	3.59	3.71	Complied
8.	Round About	2.97	2.94	2.96	Complied
9.	No Right Turn	2.83	3.92	3.38	Complied
10.	No Parking	3.30	4.03	3.67	Complied
11.	No Left Turn	2.97	3.90	3.44	Complied
12.	No U-Turn	2.90	3.94	3.42	Complied
13.	Traffic Light	2.70	3.79	3.25	Complied
14.	No Horn	4.17	4.52	4.35	Complied
15.	Speed Limit	3.97	3.79	3.88	Complied

Table 2 above reveal that the respondents agreed with all the items with a mean score above 2.50. This implies that the respondents comply with all the road signs.

Research Question 3
What are the constraints affecting the compliance with road signs and other safety devices by motor vehicle drivers?

Table 3: Mean respondents of FRSC Officials and Drivers on the constraints affecting the effective utilization of road signs and other safety devices among drivers

S/N	ITEM				Remark
1.	Inadequate road signs	1.33	1.53	1.43	Disagreed
2.	Ignorance	1.67	1.42	1.55	Disagreed
3.	Illiteracy	1.60	1.82	1.71	Disagreed
4.	Drunkenness	1.27	1.47	1.37	Disagreed
5.	Improper orientation	2.40	1.91	2.16	Disagreed
6.	When in a hurry	3.07	2.42	2.75	Agreed
7.	Absent-mindedness while driving	2.47	2.53	2.50	Agreed
8.	Road congestion	2.33	2.51	2.42	Disagreed
9.	Improper location of the Road signs	1.33	1.76	1.55	Disagreed
10.	Road signs sometimes are not legible	2.20	2.07	2.14	Disagreed
11.	Malfunction in electronic road signs	1.60	1.67	1.64	Disagreed
12.	Recklessness	1.47	1.16	1.32	Disagreed
13.	Impatience on the path of the drivers	1.53	1.27	1.40	Disagreed
14.	Undo claiming of right from the part of the drivers	1.40	1.62	1.51	Disagreed

Table 3 above revealed that the respondents agreed with item 6 and 7, while they disagreed with item 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13 and 14 with respect to the constraint affecting compliances with road signs and other safety devices among drivers.

4.4 Hypothesis 1

$H0_1$: There is no significant difference between the mean responses of the FRSC Officials and Drivers on the level of awareness of road signs among drivers.

Table 4: Standard Deviation and T-test analysis of the FRSC Officials and Drivers on the level of awareness of road signs among drivers

N_1=15, N_2=45

S/N	ITEM				SD_1	SD_2	T-Cal.	Remark
1.	Y-Junction	3.50	3.34	3.42	2.17	2.57	1.93	NS
2.	Dangerous double bend (First to Left)	3.77	3.97	3.87	2.13	2.78	1.04	NS
3.	Narrow Bridge Ahead	3.43	3.37	3.40	2.23	2.09	1.73	NS
4.	Give Way to Traffic	3.50	3.92	3.71	2.31	2.70	0.51	NS
5.	Cross Road Four-Way Junction	3.50	3.94	3.72	2.39	2.16	0.03	NS
6.	T-Junction	2.90	2.97	2.94	2.16	2.01	1.19	NS
7.	Dangerous bend Right	3.37	3.90	3.64	2.34	2.42	0.00	NS
8.	Round About	2.70	3.01	2.86	2.16	1.91	0.00	NS
9.	No Right Turn	2.70	2.92	2.81	2.16	1.91	0.43	NS

10.	No Parking	2.57	2.77	2.67	2.12	1.76	0.33	NS
11.	No Left Turn	2.63	2.92	2.78	2.25	1.85	0.14	NS
12.	No U-Turn	2.63	2.86	2.75	2.18	1.85	0.34	NS
13.	Traffic Light	3.03	2.77	2.90	2.08	2.14	2.55	S
14.	No Horn	4.03	4.37	4.20	2.39	2.14	0.35	NS
15.	Speed Limit	3.70	3.08	3.39	2.34	2.71	2.93	NS

Keys: N_1 = Numbers of FRSC Officials; N_2 = Number of Drivers; S = Significant; NS = Not Significant, SD_1= Standard Deviations of FRSC Officials; SD_2= Standard Deviations of Drivers, X_1 = Mean of FRSC Officials; X_2 = Mean of Drivers, T-Cal. = T-test value of the FRSC Staff and Drivers

Degree of Freedom (df) = $N_1 + N_2 - 2 = 25$, $T_{critical}$ =

Table 4 revealed that all the items that were not significant indicate that there is no significant difference in the mean response of FRSC Officials and Drivers, while only item 13 shows that there is a significant difference. Therefore, the null hypothesis was accepted. This gives the impetus to conclude that there is no significant difference between the mean responses of the FRSC Officials and Drivers on the level of awareness of road signs among drivers.

4.5 Hypothesis 2

$H0_1$: There is no significant difference between the mean responses of the FRSC Officials and Drivers on the level of compliance with road signs and other safety devices among drivers.

Table 5: Standard Deviation and T-test analysis of the FRSC Officials and Drivers on the level of compliance with road signs and other safety devices among drivers

S/N	ITEM				SD_1	SD_2	T-Cal	Remark
1.	Y-Junction	3.97	3.34	3.66	2.10	2.49	3.32	S
2.	Dangerous double bend (First to Left)	4.63	3.59	4.11	2.37	2.24	4.79	S
3.	Narrow Bridge Ahead	4.10	3.77	3.94	2.08	2.33	2.61	S
4.	Give Way to Traffi-	4.70	4.08	4.39	2.19	2.36	3.44	S
5.	Cross Road Four-Way Junction	4.03	3.79	3.91	2.09	2.42	2.24	S
6.	T-Junction	3.63	2.92	3.28	2.19	2.33	3.77	S
7.	Dangerous bend Right	3.83	3.59	3.71	2.29	2.40	2.20	S
8.	Round About	2.97	2.94	2.96	2.34	2.14	1.60	NS
9.	No Right Turn	2.83	3.92	3.38	2.47	1.99	-2.39	NS
10.	No Parking	3.30	4.03	3.67	2.34	2.44	-0.52	NS
11.	No Left Turn	2.97	3.90	3.44	2.44	2.14	-1.55	NS
12.	No U-Turn	2.90	3.94	3.42	2.49	2.24	-1.61	NS
13.	Traffic Light	2.70	3.79	3.25	2.32	2.06	-2.60	NS
14.	No Horn	4.17	4.52	4.35	2.19	2.48	0.50	NS
15.	Speed Limit	3.97	3.79	3.88	2.60	2.69	1.89	NS

Table 5 revealed that all the items that were not significant, this indicate that there is no significant difference in the mean response of FRSC Officials and Drivers, while item 1, 2, 3, 4, 5, 6, and 7 shows that there is a significant difference. Therefore, the null hypothesis was accepted. This also gives the impetus to conclude that there is no significant difference between the mean responses of the FRSC Officials and Drivers on the level of compliance with road signs and other safety devices among drivers.

Discussion of Findings

The finding on the levels of awareness of road signs among drivers revealed that the respondents are aware of the entire items in Table 1. The finding shows that the drivers are aware of the following road signs: Y-Junction, Dangerous double bend (First to Left), Narrow Bridge Ahead, Give Way to Traffic, Cross Road Four-Way Junction, T-Junction, Dangerous bend Right, Round About, No Right Turn, No Parking, No Left Turn, No U-Turn, Traffic Light, No Horn, Speed Limit. Contrary to this findings, Asalor (2010) asserted that Nigerians possess a very low level of awareness on the causes of road traffic accidents, previous research has shown that Nigerians know quite a lot about what could cause road traffic accidents.

Finding that related to the constraints affecting compliance to road signs and other safety devices among drivers shows that the drivers agreed that the following constraints are affecting effective utilization of road signs and other safety devices among drivers: When in a hurry and Absentmindedness while driving. The respondents also disagreed that the following constraints are affecting effective utilization of road signs and other safety devices among drivers: Inadequate road signs, ignorance, illiteracy, drunkenness, improper orientation, road congestion, improper locations of road signs, road signs sometimes are not legible, malfunction in electronic road signs, recklessness, impatience on the path of the drivers, undo claiming of right from the part of the drivers. This concurs with Idris and Mustapha (2019) that drivers often engage in activities that distract their attention while driving. Such activities include among others, gesticulating, answering phone calls, changing a radio station or cassette.

The finding on the levels at which the drivers comply with road signs and other safety devices revealed that the respondents comply with the road signs and other safety devices. The finding shows that the drivers comply with the following road signs and other safety devices: Y-Junction, Dangerous double bend (First to Left), Narrow Bridge Ahead, Give Way to Traffic, Cross Road Four-Way Junction, T-Junction, Dangerous bend Right, Round About, No Right Turn, No Parking, No Left Turn, No U-Turn, Traffic Light, No Horn, Speed Limit. All these satisfy the statement of Kumuyi (2012) that "a careful road User/Traveler who observes warning road signs will arrive his/her destination safely".

Conclusion

Based on the findings of this research, a thorough knowledge of road signs is compulsory for all road users so as to ensure a smooth and safe traffic flow with either minor or no interference.

Recommendations

The following are the recommendations made based on the findings;

- Periodic road safety education should be organized for drivers by the government and other non-governmental organizations to ensure that they are familiar with road signs and other safety precautions.
- Training and re-training should be organized for drivers by the government and other non-governmental organizations to ensure that they are familiar with road signs and other safety precautions.
- The FRSC should make sure that the road signs are broadly written and should always function
- A similar study should be carried out in other parts of the state.

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ELECTRICAL AND ELECTRONICS TECHNOLOGY ADVANCEMENT: THE NEED FOR CURRICULUM INNOVATIONS

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Abstract

The paper discussed electrical and electronics technology advancement: the need for curriculum innovations. The paper highlighted the concept of electrical and electronics, technology, curriculum, and innovation. The mechanical system in electrical and electronics are largely replaced by electronic systems which created skill gap between among graduates. Conclusions were drawn and recommendations include among others, the government should look into the curriculum used for training electrical and electronics craftsmen and technicians and consider including recent technological contents, infrastructure and materials.

Key Words: Electronic, Technology, Curriculum and Curriculum Innovation

Introduction

The word electronics comes from electrons mechanics which means learning the way electron behaves under different conditions of externally applied field. Electronics, according to Neha (2011) means the study of flow of electrons in electric circuits. It is studied as a branch of vocational education to provide youths with gainful entrepreneurial skills. Equipping the learners with productive skills according to UNESCO (2009) is to reduce the tide of such challenges facing the youth global financial economics crises, unemployment, job deskilling and poverty. The same UNESCO document emphasized that young people need entrepreneurial skill oriented anchors that will enable them to cope with the global tensions, pressures, unemployment and contradictions in their daily lives. It was in line with the above that UNESCO (2001) reviewed Radio Television and Electronics department specialized areas as; Radio communication, Radios and Audio Frequency Amplifier, Satellite Transmission & reception, and Television. The mechanical system in electrical and electronics are largely replaced by electronic systems (Michael, 2014). According to Maitland (2013), electronics that are built using microcontrollers, digital signal processors using sensors and actuators are commonly described as modern electronics.

Modern electrical and electronics, employs the integration of electronic systems and complex computers to control and measure the performances of the electrical and electronics while the machine is running. Amaechi (2012) sees the essence of Electrical and Electronics curriculum as intended to expose learners to entrepreneurial skills in resource management, marketing, strategic planning and time management skills to help them meet up with the challenges of unemployment, job disliking and poverty. In the past few years, the electrical and electronics have seen major changes in designs and special features. Electricity services to households are a major leap in technological development. Most households' chores that use to be time consuming, energy sapping and dreadful becomes easier, faster and interesting with the use of electrical appliance. Electricity is the choice energy resource for everybody (Ogbuanya, 2005). Perkins and Thompson (2014) posited that electrical and electronics technicians needs to change too in order to catch up with the challenges that may lead to competency and skills mismatch in the maintenance of modern electrical and electronics.

Electrical and electronics Technology

Technology could be seen as all the knowledge, products, processes, tools, methods and systems employed in the creation of goods or in providing services. Khalil (2000) defined technology as the collection of techniques, skills, methods and processes used in the production of goods and services in the accomplishment of objectives such as scientific investigation. Technology is also an application of science used to solve problems. According to Bennett *et al.*, (2006), technology is a body of knowledge devoted to creating tools, processing actions and the extracting of materials. Technology is used to accomplish various tasks in our daily lives and can be described as products and processes used to simplify our daily lives. Technology and the use of computers have become part of life; things which were done manually centuries ago can now be done technologically with the use of computer. A typical example of transition from manual operated piece of technology to computerized operation is electrical and electronics. Robbins and Judge (2007) revealed that, electrical and electronics which were manually operated some centuries back are now electro-mechanically operated. Computers are common place in modern day electrical and electronics design, radio communication, electronics device and circuit, Radio and Audio Frequency Amplifier and Television.

Electrical and electronics technology has been evolving since the turn of the century. Electricity services to households are a major leap in technological development. By the early 1980's the introduction of information technology in electrical and electronics has triggered the most rapid technological advancement in the electrical and electronics industry. Most households' chores that use to be time consuming, energy sapping and dreadful becomes easier, faster and interesting with the use of electrical appliance. Electricity is the choice energy resource for everybody (Ogbuanya, 2005). Installation deals with an assemblage of electric equipment in a given location designed for co-ordinate operation, properly erected and wired. This may be in domestic or industrial premises with the computers available, electrical and electronics designers have developed numerous approaches and controls. Duffy (1995) noted that, technologies have recently been incorporated in all new electrical and electronics subsystems and have become standard implementation on many others. These features are rapidly becoming standard features in all new electrical and electronics owing to change in customer's taste for electrical and electronics and status symbols attached to electronics ownership.

These systems require maintenance and repairs and the competencies required to maintain electrical and electronics of the less modern technology show little similarity with the competency required of modern electrical and electronics. Lindsay (2013) stated that, electrical and electronics craftsmen who are majorly the products of formal education used what is termed the 'try and error' to repair almost all electrical and electronics. Rapid development of electrical and electronics technology has presented some challenging problems for electrical and electronics craftsmen in the country.

For electrical and electronics craftsmen to be able to use certain tools, the electrician must be able to understand the principles behind its usage. The rate of change in technology is exponentially increasing. Mobley *et al.* (2009) estimated that, only electrical and electronics craftsmen with specialized knowledge or training will have the best opportunities. The educational systems responsible for training electrical and electronics craftsmen must develop their capabilities to keep abreast of technological changes and to harness technology through curriculum innovation.

Need for Curriculum Innovation

Curriculum is the combination of instructional practices, learning experiences, and students' performance assessment that are designed to bring out and evaluate the target learning outcomes of a particular course. Gatawa (2009) defined curriculum as a framework that sets expectations for student learning. It serves as a guide for teachers, a roadmap if you will, that establishes standards for student performance and teacher accountability. Curriculum encompasses a variety of technical and non-technical courses that are required to complete a specific degree. Bishop (2006) described curriculum as series of things that students must do and experience by way of developing abilities to do the things well that adults do in life; and to be in all ways the people that they should be as adults. Curriculum includes everything that takes place, and everything that does not take place, within the purview of the school. Effective curriculum needs to be up to date with the recent technological advancement which calls for curriculum innovations.

Curriculum innovation means changing some of the fundamental elements of the curriculum. The fundamental elements are: aims, content, (what is to be taught) methodology, (how it is going to be taught), and evaluation. This implies change of the internal organization of the school relationship, change of relationships between schools and government agents which control education. This permeates to what success or failure is, and the examination itself. Curriculum innovation is not a matter of supply of appropriate technical information, rather it involves changing attitudes, values, skills and relationships. Gatawa (2009) argues that curriculum innovation requires expertise, if there is no motivated force to introduce and direct change, the status quo is likely to persist.

Ndawi & Maravanyika (2011) disclosed that generic term for both curriculum innovation and improvement is curriculum change, curriculum change may bring in something new (an innovation) or improve the curriculum an improvement. Thus change and innovation are synonymous.

The basic conditions for curriculum innovation or change is the existence of school structures which can accommodate and accelerate change. Bishop (2006) noted that, it is important to note that there must be readiness to accept this change, which is curriculum innovation or renovation. There are reasons for curriculum innovation, some of the reasons are: knowledge, individual, societal and political needs. Knowledge is a powerful agent for curriculum innovation; frontiers of knowledge are ever expanding. Curriculum should accommodate new funds of knowledge (Gatawa, 2009). The second reason for curriculum innovation is the need to make the curriculum relevant to individual, societal and national needs. National needs can either be political and social or need to produce own skilled manpower. Ndawi and Maravanyika (2011) stress that curriculum innovation of any scale is always complicated than anticipated. This is due to the reason that changing any one component of interrelated systems precipitates a chain reaction of other changes.

Conclusions

Obviously, as the electrical and electronics becomes more technological in nature the task of repairing it also changes. The days of being only mechanically inclined are gone for most electrical and electronics craftsmen. The electrical and electronics technicians and craftsmen must be able to understand and appreciate the use of technology as a business tool. Once the electrical and electronics technicians and craftsmen understands how the technology behaves, the electrical/electronics equipment of today will not be complicated to repair. This can be achieved by having the curriculum used for training electrical and electronics technicians and craftsmen adapt to technological changes and advance accordingly. Hence, curriculum innovation becomes necessary to adapt the technological changes in modern electrical and electronics.

Recommendations

Based on the reviewed literatures, the following recommendations were made:

1. The government should look into the curriculum used for training electrical and electronics craftsmen and technicians and consider including advanced technological contents and materials.
2. Technocrats should be involved in curriculum innovations so as to come up with a document that is in line with national needs and global trends in current technology.
3. Curriculum innovators should include relevant professional bodies so that national needs and desired competency in electrical and electronics technology are realized.

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CURRICULUM AND INDUSTRIAL DEMAND: A TOOL FOR INDUSTRIAL EFFICIENCY

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Abstract
This paper discusses the efficiency of the industry via proper design curriculum, the curriculum are more responsible to industry needs and provide the students with employable skills and positive work values needed to meet the changing demands of industries and global environment. The existing methodology is based on basics and current trends of the domain these curriculums developed only theoretical knowledge they won't get any industrial based exposure to overcome this issue, the proposed methodology is based on education and innovative in the industry, current trends in the job market are also considered while developing the syllabus. The paper submits recommendations on further enhanced strategies that will help in the development of education in line with modern trends in curriculum issues.

Keywords: Curriculum demand, development, Industry

Introduction

The curriculum for individual course has been designed by a perfect blend of inputs from renowned academicians and industry experts for each university. To make every graduating student academically excellent and professionally groomed to assume leadership roles in every sector of the industry and economy. The component of curriculum design is along these lines determination and association of educational programs content, educational programs assessment, advancement, circulation and the pertinence of the educational programs is what is required today. There are four primary stake holders: students, educational institutions, the industries and the last but not the least the Government. In the incorporation of industry, instruction, research and development cooperating as key drivers of the learning economy in conveying reasonable development.

Reasons why TVET Institutions Need Linkage with Industries

The following are the reasons why TVET need linkages with industries as anything in isolation will make national development to remain an illusion in Nigeria.

1. **Cost of Establishing TVET Institutions:** TVET is a skill oriented programmes that requires facilities for effective implementation and it involves huge amount of money. It has been observed that very few countries can afford to provide a comprehensive and effective TVET system purely through government financing and Nigeria is not among the few countries. In many developed countries, it is estimated that up to 80% of skills development is provided by industry for its own workers (Lembagu, 2012). This means that the facilities needed for up to date effective skills impartation are better found in industries when compared to TVET institutions. Linking TVET institutions with industries will provide the institutions access to facilities that are not in school and expose their students to have skills relevant to the industries. This is in line with Osman, Omar, Kofi, Mat, Darus and Rahman, (2008) that technical institutions should have closed linkages with the world of work to solicit support of industry in the enhancement of practical

training through such activities as donations of equipment and tools, staff exchange programmes and staff on work experience attachment

2. **Because Industries are the Primary Consumer of TVET Graduates:** The outputs of TVET institutions are the inputs of the industries. It is worthy of note that for the products of TVET institutions to be relevant and contribute to the nation's development, effective industrial – TVET linkages most be established. This is in agreement that in vocational education, practice and theory must go hand in hand, because the more intimately they are related to each other, the more the school will contribute to the learners immediate success in the school and make the person a master of his field (Amaand Offei-An-Sah, 2011). Similarly, Pautler in Amu and Offei-AnSah, (2011) noted that TVET institutions must have a partner to help find solutions and this can be accomplished only by developing linkages with industries so that they can survive and accomplish their intended goals of providing the skilled manpower needs of the country. According to Daily Graphic (2005), poor linkage between vocational institutions and industries has resulted in graduates from such institutions not being accorded the deserved recognition by employers thus contributing to delays in the graduate employment and national development process. This is why TVET- industrial linkage is important for national development, as it enhances the skills of TVET products to be relevant in world of work.

3. **Because of the Rigidity in TVET Institutions Curriculum:** The main aim of any educational institution curriculum is to serve the need of the society and TVET is not left behind in this context. The curriculum of TVET is meant to reflect the need of the labour market (Industry) which is the end consumer of the products. In Nigeria, there exist a mismatch in the curriculum of TVET and the work skills requirement of the industries. It is noted that TVET curriculum teach the history of technology and not the practical skills currently required by industry. Industrial participation in TVET curriculum and workplace training opportunities is the primary ways of achieving this. If employers are not involved in the process of the specific skill attitude and behavior required by graduates, they are less likely to see any relevance between TVET and their skills needs. Therefore, it is important to involve industries during TVET curriculum development so that required skills as needed in the industries are reflected.

Challenges facing TVET institutions linkage with industries in Nigeria

TVET is an important tool that can improve the employability of individuals, increase productivity in industry and reduce poverty, however, it suffers from a mismatch as it produces entrants to labour force with qualifications that do not match the requirement of the productive sectors of the economy in Nigeria. The following are the notable challenges facing TVET-Industry linkage in Nigeria:

a) Non-involvement of industry representatives in development of TVET Curriculum: The curriculum of any TVET institutions should bear the skill needs of the industries in mind as they are the end users of TVET products. In the development of TVET curriculum, employers of labour are not usually consulted to provide the skills they need TVET institutions to inculcate in their students to become employable in the work place. According to Tansen (2013), TVET system is hampered by inadequate links with industry, outdated curriculum and delivery strategies, little flexibility to respond to training needs at the local level as industries are not consulted during the accreditation process of the curriculum. This shows that there is no feedback from the employers to TVET institutions leading supply driven training skewed in favour of theory. According to Amissah (2006), TVET linkages with industry in terms of input for curriculum development are weak resulting in mismatches of supply and demand skills. Technical graduates lack hands on experience and have poor work attitudes and are inflexible to changes happening in industries (Republic of Kenya, 2002).

b) Lack of teaching and learning resources: Lack of up to date teaching and learning facilities in TVET institutions is a factor that has contributed in widening the gaps between TVET and industries. It has been observed that most TVET institutions in Nigeria still use outdated facilities that are no longer relevant in industries as teaching and learning facilities. This is in agreement with UNESCO (2000) that less than 1% of secondary education in Nigeria is oriented towards technical and vocational skills, worse still, workshops for TVET at tertiary education level showcases dumps of outdated and obsolete machines, equipment and tools. This ugly situation could be attributed to inadequate funding of education by the government at all levels in Nigeria. According to Offei-Ansah (2011), TVET teachers have limited experience of life outside the classroom and no access to resources materials through which to emphasize relevance. It is has been observed that industries are the end users of TVET products, and currently, skill activities in industries are changing as the demand of the society is changing while little or no change is taking place in TVET institutions hence the gap between TVET and industries.

c) Image of TVET in Nigeria: TVET graduates are struggling to fit in the work place because of the wrong perception society placed on it. Nigeria graduates of engineering and other related trades are often referred to as engineers and this has a greater influence on the way society looks at it. It is entirely different in TVET graduates as there is no generally acceptable name given to the graduates from TVET to place them shoulder to shoulder with graduates from engineering faculties in Nigeria. It has been observed in industries where TVET students seeking for industrial attachment are been rejected on the ground that they are not from faculty of engineering. Similarly, Ratnata (2013), found out that young people and their parents whenever they have the possibility chose higher education over TVET due to their predominant perception of TVET not as valuable as general education. The statement also buttressed the assertions of Okoye and Okwelle (2014) that low societal estimation of TVET with its professional practice not seen as a substitute to gaining employment in any other quarters that are highly remunerated lends TVET inferior in the eyes of the public. According to AU (2007) and Afeti (2008), the impression sometimes created by government that the primary objectives of the TVET track is to keep dropouts off the streets rather than project this type of training as an effective strategy to train skilled workers for the employment market. This is a worrisome situation that has hindered the advancement of TVET in the country including industrial linkage.

d) Lack of Legislation: In Nigeria there is no law binding TVET institutions and industries which are the end consumers of TVET products. According to Asare-Bediako (2005), there is no legal framework for coordination of the activities of the government ministries, private organizations and agencies that participate in the provision of TVET in Nigeria. Tertiary institutions and industries are two different social entities; as a result they differ considerably in the nature and objectives of their activities. This is in agreement with Siegal (2003) that cultural barriers are pervasive in tertiary institutions and industry interactions, given that stakeholders operate under divers organizational environment and have different norms, standards and values. The author noted that firms typically do not want researchers to publish their results and the academics believe that the body of knowledge generated through scientific activity is subject not to private, but to public ownership. This is obtainable in Nigeria, because there is no legislation binding TVET and industries together.

Strategies for effective TVET Institutions-Industry linkage in Nigeria
It is evident that linkage between TVET institutions and industries in Nigeria is weak due to some known challenges which demand for enhancement strategies.

a. **Sharing of equipment and tools:** TVET is an expensive educational programme that government cannot finance alone because of the dynamic nature of the work skill requirements. Sharing of equipment and tools between TVET institutions and industries for teaching and learning will equip the students with the skills on how to use facilities that are not in school but are needed in the work place. This is in line with Republic of Kenya (1999), that technical institutions should have close linkage with the world of work to solicit support of industry in the enhancement of practical training through such activities as donations of equipment and tools. It has been observed that most students do not have sound knowledge of what goes on beyond the school environment and so are not aware of the requisite skills, knowledge and attitudes expected of them in the work place (Asare-Bediako, 2005). Therefore, the sharing of equipment and tools between TVET institutions and industries will establish a good link, and as well solve the challenges caused by lack of up-to-date teaching and learning resources in TVET institutions.

b. **Staff/Students Exchange Programme**: Involving staff from industries to participate in the teaching of TVET students practical skills as it relate to the need of industries is a good link that will usher in the desired change in the nation's workforce. TVET teachers/lecturers can also go for instructors' industrial experience during long vacation to update their skills in latest tools and equipment used in industries. This is in agreement that technical institutions should have close linkages with the world of work to solicit support of industry in enhancement of practical training through staff work experience attachment (Republic of Kenya, 1999; Obwoge et al, 2013). According to Amu and Offei-Ausah (2011), excursions and field trips to industrial sites can be an effective means of establishing link between the TVET institutions and industry to help in equipping graduates with usable skills for the world of work. The authors identified that participation of industries in the training of students in form of seminars and workshops is another major way of linking TVET institutions and industries.

c. **Involving industries in development of TVET curriculum**: It has been observed that the mismatch in the skills acquired in TVET institutions and the actual skills needed in the work place is as a result of non- involvement of industries in the development of TVET curriculum. Therefore involving industries during TVET curriculum development will serve as a major pathway to linking TVET institutions to industries. This is in accordance with Tansen (2013) that employer representatives if involved in curriculum development will identify occupations where training gaps exist and specify the required skills standard.

d. **Up Lifting the image of TVET**: There is no doubt that TVET is faced with image problem in Nigeria as a result of wrong perception that TVET is education for the dropouts. The creation of awareness to show that TVET is the power house of Nigeria work force as it equips individual with skills needed to be employable and self-reliant in life becomes an imperative. This is in line with Okoye and Okwelle (2013) that providing training within national policy framework, increased funding, strengthens guidance and counseling services to trainees as well as promoting industry and academic interaction among others will enhance the image problem of TVET in Nigeria.

e. **Provision of Appropriate Legislation**: There can be meaningful linkage between TVET and industries in Nigeria, if there is any law mandating all the industries to participate in the training of both the students and staff of TVET to equip them with the skills needed in the world of work. This is in accordance that clear national legislation and policies to support linkages between TVET and industry with legal requirement of the compliance and enforcement by government are the ways to ensure TVET-industry linkage (http://www.tvet.com). Therefore, appropriate legislation that will ensure that all the industries in Nigeria participate and that the participating industries obtain cheap labour from TVET students and staff to maximize profit while both the students and staff acquire the practical skills, knowledge and attitude needed to be employable and self-reliant upon graduation will serve as good reinforcement to TVET-industry linkage.

Conclusion

This paper looked at the curriculum and industrial demand as a tool for industrial efficiency and has shown that there is little or no linkage between TVET situations and industries which are the end users of TVET products. This probably may have been the aim of many industries in Nigeria for rejecting TVET graduate applicants or retraining their new employees immediately after recruitment to equip them with the needed skills in the industries. If proper strategies and links are established, this mismatch will be greatly reduced and TVET graduates will come out with skills that are employable, effective, relevant and applicable to the labour market.

Recommendations

The following recommendations are made for effective TVET institutions and industries linkage for national development in Nigeria:

1. Sharing of equipment and tools between TVET institutions and industries should be encouraged to keep abreast of changes taking place in the world of work.
2. There should be collaboration between TVET institutions and industries during curriculum development to carter for the skills needs of the industries.
3. Nigeria government should set up policies and legislation requiring mandatory linkages between TVET and industrial institutions to enhance employability skills among TVET graduates.
4. There should be regular staff and student exchange programmes between TVET institutions and industries to equip students and staff with the practical skills while industries benefit from the theoretical knowledge of staff and students of TVET.

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COPING WITH BEHAVIOURAL CHALLENGES OF TEACHING LARGE CLASSES IN INDUSTRIAL AND TECHNICAL EDUCATION IN TERTIARY INSTITUTIONS

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Abstract
Large classes pose a potential threat to the quality of the educational environment and may have particular ramifications in developing industrial and technology education teaching and learning, Behaviour problems in a classroom increase the stress levels for both the teacher and students, disrupt the flow of lessons and conflict with both learning objectives and the processes of learning. They also change the classroom dynamic as the focus of attention shifts from the academic tasks at hand to the distractions provided by disruptive behaviour. Typically, coping strategies such as effective instructions and commands, connecting with the students, sense of honor sequence of activities, Pace of instruction is best if it is brisk, Document rules and encouraging initiative of the learner are ways of curbing distracting behaviour of the learning in the large class. one or two students are identifiable as 'problems', sometimes they act in ways that compound management difficulties by inciting each other and, possibly, others in the class into disruptive activities. The usual response to problematic behaviour is to identify the student involved as 'the problem', to focus on them as a source of 'trouble' and to devise strategies specifically to deal

Key words: Coping Behavioural Challenges, Teaching and Large Class.

Introduction

Large-class environments are a reality for many who teach at higher education institutions around the world. Such environments are commonly believed to pose real challenges for educators and students alike: the former, because they seek to deliver a meaningful learning experience; and the latter, because they not only seek to gain knowledge, but also to develop critical thinking skills. Indeed, large classes pose a potential threat to the quality of the educational environment and may have particular ramifications in developing countries, where higher education constitutes a core dimension of the economic and societal development process (Barry, 2012). The link between quality education and socio-economic development is almost a truism today, and it is safe to assert that quality education is a key component in the development of all countries and can be correlated with improved income levels and economic growth according to (UNESCO, 2005). The expansion in enrolment in higher institutions in Nigeria in the midst of limited resources translated in the 1980s and 1990s into more numbers in classes. The phenomenon of large classes is fast becoming one to be contended in which higher institutions in the region. The outlook for the future is the experience of many more large classes. But of course, large classes are found in institutions the world over. Since we cannot avoid large classes, we have to devise techniques for delivering good quality education in such settings as stated by (Barry, 2012).

In a classroom environment, one of the biggest obstacles you may face is dealing with students with challenging behavior, Not only does the students affect you trying to teach a lesson and maintain control, but they also disrupt the productivity of the class as a whole. Children who display challenging behavior don't usually do so 'just because they want to'. There's often a reason behind their behaviour or it might be their only way of telling you something's wrong as opinion by David, Ruksana, and Jacqueline, (2018). All behaviour is a form of communication. Therefore, it's essential that you understand the causes of challenging behaviour and know what strategies will help you deal with it.

According to Richardson, (1999*),* behaviour problems in a classroom increase the stress levels for both the teacher and students disrupt the flow of lessons and conflict with both learning objectives and the processes of learning. They also change the classroom dynamic as the focus of attention shifts from the academic tasks at hand to the distractions provided by disruptive behaviours. Typically, one or two students are identifiable as 'problems', sometimes they act in ways that compound management difficulties by inciting each other and, possibly, others in the class into disruptive activities. The usual response to problematic behaviour is to identify the student(s) involved as 'the problem', to focus on them as a source of 'trouble' and to devise strategies specifically to deal with their inappropriate behaviour as stated by Amada (1999).

Technology education teacher being the major focus of this review, hinges it thrust in the type of education a teachers receive to enable them become acquainted with the practical use of available technology. It is a study of technology which provides an opportunity for teachers and students to learn about the processes and knowledge related to technologies that are needed to solve problems and extend human potential" (ITEA, 2000). Here, human ability is used to shape and change the physical world to meet needs, by manipulating materials and tools with techniques. The inculcation of this type of education to teachers will invariable revamp the fate of technology education as the right education that will be geared towards useful living among teacher education students will be given to them for functional development. Technology education develops interest and curiosity among the students. It provides not only theoretical knowledge to the students but also make them professionally skilled in subject by providing practical knowledge. Through technology education, students become aware of their social status by keeping themselves up-to-date and can solve their problems by sitting together for group learning as well as promoting creativity, retention and entertainment to students. Teachers in Nigeria technology education need adequate training and education on technology education for reliable, appropriate and functional teacher education since there are seen as the main focus in technology education due to their indispensable role they play in the teaching and learning process.

The Concept of Large Class

Large class is a relative term and so not always very easy to define, consequently we define a large class not in terms of a numerical threshold, but rather as an environment where the quality of student learning may be negatively impacted by the number of students in the class. Given the diversity of learning contexts that may exist – varying approaches to and styles of learning, unequal access to teaching and learning support mechanisms, unique disciplinary milieus, and developed vs. developing countries – a large class may be defined in different terms depending on the discipline and/or the pedagogical needs of the learning environment. For example, in during practical studies, any class with more than fifteen students may be considered large, whereas a first-year technical education class would be defined as large if the number of students exceeds a hundred; and a higher education institution with limited access to teaching technology may have a different opinion from one with sample technological resources when it comes to what constitutes a large class. While we do not want to discourage assigning numerical thresholds for conceptual purposes (as some of the authors in this volume do), we consider the concept of a large class to be broader and wish to advance an interdisciplinary debate about how to cope with these behavior.

There is a long-standing belief that the number of students in a class affects the quality of the learning environment (David, et al., 2018). In particular, large classes are believed to correlate with low student performance. However, class size in and of itself is not a distinguishing feature of student performance; instead, class size matters in relation to education goals and the quality of the educational experience. In higher education, education goals move beyond simple knowledge acquisition to promoting student engagement and higher order cognitive functions – characteristics of deep learning. Here, class size does matter and can affect the quality of student learning (Okenjom, Ogar, Bake, & Eze-Anyim, 2016).

Class Room Management in Industrial and Technology Education (ITE)
Classroom management refers to the wide variety of skills and techniques that teachers use to keep students organized, orderly, focused, attentive, on task, and academically productive during a class. When classroom-management strategies are executed effectively, teachers minimize the behaviors that impede learning for both individual students and groups of students, while maximizing the behaviors that facilitate or enhance learning. Generally speaking, effective teachers tend to display strong classroom- management skills, while the hallmark of the inexperienced or less effective teacher is a disorderly classroom filled with students who are not working or paying attention (Reko, & Maxwell, 2016).

While a limited or more traditional interpretation of effective classroom management may focus largely on "compliance"—rules and strategies that teachers may use to make sure students are sitting in their seats, following directions, listening attentively, a more encompassing or updated view of classroom management extends to everything that industrial an technology education teachers may do to facilitate or improve student learning, which would include such factors as behavior (a positive attitude, happy facial expressions, encouraging statements, the respectful and fair treatment of students), environment (for example, a welcoming, well-lit classroom filled with intellectually stimulating learning materials that's organized to support specific learning activities), expectations (the quality of work that industrial and technology education teachers expect students to produce, the ways that teachers expect students to behave toward other students, the agreements that teachers make with students), materials (the types of texts, equipment, and other learning resources that teachers use), or activities (the kinds of learning experiences that teachers design to engage student interests, passions, and intellectual curiosity). Given that poorly designed lessons, uninteresting learning materials, or unclear expectations, for example, could contribute to greater student disinterest, increased behavioral problems, or unruly and disorganized classes, classroom management cannot be easily separated from all the other decisions that teachers make. In this more encompassing view of classroom management, good teaching and good classroom management become, to some degree, indistinguishable.

Challenges of Learning Behaviour of Student in the Large Classes of ITE

The anti-learning behaviour are not only being manifested in large classes but because if it's class rooms with small size, there could be spotted and sanction by the teacher (Okenjom, et al., 2016). Those behaviours include the following:

i. Arriving late to school/lesson
ii. Unwanted non-verbal noises
iii. Persistent infringement of class rules
iv. Talking out of turn
v. Calculated idleness or work avoidance
vi. Hindering other students
vii. Getting out of seat without permission
viii. Verbal abuse of other students
ix. General rowdiness or 'mucking about'
x. Cheeky remarks or impertinence to teacher
xi. Physical aggression to other students
xii. Verbal abuse to teacher
xiii. Physical destructiveness
xiv. Physical aggression to teacher
xv. Writing test or assignment for a friend in proxy
xvi. Cheating during classroom test
xvii. Inactivity or passivity (a deliberate refusal to participate in learning activities in the class) Sleeping, dozing while lectures are on

Strategies for Controlling the Behavioural Challenges of Teaching Large classes in Industrial and Technology education

1. **Effective Instructions and Commands:** this need to be preceded by getting the pupils' attention, and then presented clearly one at a time as "do's", in a firm (not angry) voice, with time to comply and praise for compliance. Precise, specific, direct and paced (one-at-a time) instructions delivered in a calm and quiet voice, followed by praise for compliance have been found most effective (Amada, 1999).

2. **Sequence of Activities:** Sequencing of activities so that easy and brief tasks are interspersed with longer and more demanding ones, enhances engagement and learning as well as reducing disruption. Preceding difficult activities with a few simple ones has been found to enhance transition to a new activity as has scheduling active learning after breaks before moving on to more passive activities so that students have time to adapt to quieter routines.

3. **Pace of Instruction is Best if it is Brisk**: This can be achieved by increasing the rate of instruction or decreasing the pauses between student response and the presentation of the next task. Increased pace needs to be managed so that the students do not lose opportunities to respond and access reinforcement.

4. **Connect with the Students:** It is important to appear approachable in large classes. Build rapport with your students, and recognize the individuality of each student. Move among them when talking. Increase student access to you by getting to class early to listen to their questions, comments, or complaints. Begin by inviting students to call out something they know or recall about a topic. Display the responses as an introduction to the day's activities. Address some of the anonymity students feel in large classes.

Try to learn some names, and call on those you know by name. Learn something about as many students as possible. Ask for a few volunteers each day to help with demonstrations and activities and throughout this process learn some student names.

5. **Have a Sense of Honor:** You need to have a sense of honor in the classroom. If you do not, there may be a disconnection between the teachers and the students because the student will not like you and you will not like them. Using a sense of humor with your students is the best way to disarm a bad situation. Be sure to be careful with your sense of honor. If you try to carry it too far with students who do not understand their limits, you could have a potential rowdy class who thinks you are a clown and a pushover. Dispel this notion by constantly giving them guidelines. Once they have the guidelines for classroom behavior, they will "get" your sense of honor.

6. **Never Raise Your Voice:** A disruptive class is just waiting for you to raise your voice and yell at them—they love it. It gives the students a chance to raise their voice and argue back. They love retelling stories about the teachers who "lost it," especially if they know they were the ones who caused it. Be careful that you don't show up in their Twitter feeds. Do not give them the pleasure. Staying calm, cool, and collected is the key.

7. **Use the Silent Stare:** When the classes are talking too much or out of their seats, the teacher need to stand in front of the class and simple stare at the class. One of the students gets the hint. Then you hear, "Shhh, shhh, shhh!" all over the room. Act like u did not even recognize the loudness in the room, and you start or resume. There have been a few times that it has taken a class too long to quiet down. In those few occasions, obviously, you know what is going on to do. Even though they would like to make you think you are unimportant at times, most of them know they need you.

8. **Learn your Students Names**: As a teacher you have to admit, learning their names is the hardest part for but you start looking at rosters over the summer. On the same vein Barry, (2012). If you have a troublemaker in class, you want to be able to call that student by name on the first day of school. Unfortunately, the ones who want to cause problems are the ones easiest to remember. The students who do not say much are the ones you need to work on most. Remembering their names shows all your students that you care about who they are and what they do. Many times, just knowing a name will help stop a kid from creating trouble.

9. **Send the First Disrupter to the Hall and the Second to the Office:** In the beginning of the year, you must set the tone. If they are going to make trouble in my class, you give the first warning, "The first one goes to the hall and the second one goes to the office." There are usually at least two pushing the buttons - many times together. You must follow through with the threat so they know you mean business. When you show them in the beginning of the year that your objective is to teach them and not truancy them, they get the message quick. Students love to test teachers. Not because they are "bad" but because of the limitation of there knowledge. Some students, even in high school, do not understand why they are being disciplined. Make it clear in a way that lets the student know you want their success. The same goes for if you send a student to the office. Find a time to discuss what happened to lead to the discipline. If student know you are still on their side, they will try harder to do better for you.

10. **Let your Administrators know About your Class:** If you have a class full of male student who are childhood friends and loved to have fun and aggravate. They wanted the tone to be "students against the teacher" tone and made it clear from the beginning. For you to inform the administration about it. Letting the administrators know about the situation prepares you and them for any situation that might arise.

11. **Document Rules:** Don't let your mutually-respected guidelines go forgotten. Similar to handing out a syllabus, print and distribute the list of rules that the class discussion generated. Then, go through the list with your students. Doing this emphasizes the fact that you respect their ideas and intend to adhere to them. And when a student breaks a rule, it'll be easy for you to point to this document. If you're feeling creative, you can include the rule list in a student handbook with important dates, events and curriculum information.

12. **Encourage Initiative:** Promote growth mindset, and inject variety into your lessons, by allowing students to work ahead and deliver short presentations to share take- away points. Almost inevitably, you'll have some eager learners in your classroom. You can simply ask them if they will like to get ahead from time-to-time. For example, if you're reading a specific chapter in a textbook, propose that they read the following one too. When they deliver their subsequent presentations to preview the next chapter on your behalf, you may find that other students want a bit more work as well.

13. **Offer Praise:** Praise students for jobs well done, as doing so improves academic and behavioral performance, according to a recent research review and study. When it is sincere and references specific examples of effort or accomplishment, praise can: Inspire the class Improve a student's self-esteem Reinforce rules and values you want to see Perhaps more importantly, it encourages students to repeat positive behavior. Let's say a student exemplifies advanced problem-solving skills when tackling a math word problem. Praising his or her use of specific tactics should go a long way in ensuring he or she continues to use these tactics. Not to mention, you'll motivate other students to do the same.

14. **Treat Students with Respect:** From the first day, always remember you are the adult and they are the student. You must also show them respect if you want to receive it in return. If a kid is constantly acting up in class and nothing has worked, go out in the hall with the kid and say, "Listen, you are disrupting class which is not good for anyone. There are students in there who want to learn, and you are keeping them from it. I know you are just having a good time, and I don't think you are a bad kid. It is just that you and I each have a job to do in there. You need to be quiet and calm while I am teaching, and I need to keep my focus. There are appropriate times for this type of behavior, but in the middle of class or work time is not the time or the place. Now, let's go back in and act like decent human beings to each other." That last line usually gets a smile. When u treat a disruptor with respect (when their behavior hasn't gone overboard), and in return we go back into the class and things are better. Students need to know teacher understand and respect them. Sometimes, the teacher does have to send the student to the office. Many times it can be handled one-on-one and a new respect for each other grows from those times. There are times that you have to constantly work on that student-teacher relationship.

15. **Taking Attendance of Students periodically and Randomly:** taking attendance of students periodically could serve as check against truancy absenteeism without permission and lateness to class. Because the list will be long and time wasting, I will be difficult to call out the names of all the students the suggestion therefore is to scan through and call names or the matriculation number of the students randomly and insist that they stand up to be recognized. When this is done in three lectures either in successions or not information will round that lectures either in succession or not, information will go round that the lecturer takes attendance and so incidences of truancy and absenteeism without permission could be minimized.

16. Choice and access to preferred activities increases engagement and reduces problem behaviour. Using children's own special interests as the basis for activities can significantly increase engagement.

Recommendations

The researcher strongly recommended the following as strategies for coping with behavioural challenges in teaching industrial and technology education.

1. Divide the class into groups for effective management teaching skills.
2. Provide overhead projector and sound system.
3. More teachers should be employee to cope with the number of students admitted.
4. There should be frequent power supply in our workshops to promote practical skills.

Conclusion

large class is the process where the quality of student learning may be negatively impacted by the number of students in the class whereas Classroom management refers to the wide variety of skills and techniques that teachers use to keep students organized, orderly, focused, attentive, on task, and academically productive during a class. When classroom-management strategies are executed effectively, teachers minimize the behaviors that impede learning for both individual students and groups of students, while maximizing the behaviors that facilitate or enhance learning. Perhaps most importantly, as technology education teacher there is need to consider your own behavior as well as that of our students. An honest attempt to understand how our classroom deportment might contribute to a difficult situation may help to reduce incivilities in our classrooms.

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CURRICULUM OF INDUSTRIAL AND TECHNOLOGY EDUCATION (ITE) PROGRAMMES AND THE CHALLENGES OF INDUSTRIAL DEMAND

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Abstract
This paper, look at the industrial and technology education curriculum and industrial demands and job opportunities for the graduates of industrial and technology education. The goals of technology education are to provide courses of instruction and training in engineering and other technologies, applied sciences, business and management leading to the production of trained manpower, to provide technical knowledge and skills necessary for agricultural, industrial, commercial and economic development of Nigeria. Some of the job opportunities stated in this paper are: Teaching in secondary schools, technical colleges, and other areas related to their specializations. Some of the challenges in implementing the industrial technology education curriculum in universities are; Institution related factors, human resources, Government related challenges and students related challenges. The following were recommended; Government and institution should strengthen their relationship so that stable calendar, adequate and functional equipment will be available, universities should employ more competence manpower. Government should increase funds in I.T.E programmes with serious follow-up, to be sure that the money is used for the right purpose and universities should reinforce strict rules and regulations regarding cultism, examination malpractices and other academic vices.

Key words: Curriculum, Program, Challenges, Industrial Demand

CURRICULUM OF ITE PROGRAMMES AND THE CHALLENGES OF INDUSTRIAL DEMAND

Introduction

The curriculum plays an important role in providing quality education for students. This paper focuses on the industrial and technology education curriculum in institution of higher learning of Nigeria from the perspective of the industry. The industrial technology education is a dynamic field that integrate industrial experience and fundamental knowledge from high institutions of learning FRN (2013) state the goal of technology education as:

1 To provide courses of instruction and training in engineering and other technologies, applied sciences, business and management leading to the production of trained manpower.

2 To provide the technical knowledge and skills necessary for agriculture, industrial, commercial and economic development of Nigeria.

3 To give training that impact the necessary skills for the production of technicians, technologies and other skills personnel who shall be enterprising and self reliant.

4 To train people who can apply scientific knowledge to solve environmental problems for the convenience of man and;

5 To give exposure on professional studies in the technologies.

Our world is constantly changing most often this changes needs serious challenges that make demand on the curriculum, the reason why the curriculum is dynamic is to incorporate emergent problems and issues in the industries and the society, otherwise it ceases to be relevant. Izuab. A.C and Eke O.E (2013) says that the curriculum must be dynamic to equip the current knowledge and competence to confront new challenges they sees education as the key to societal transformation and curriculum is the tool for achieving this purpose.

FRN (2018) states that all programmes in science and technical education and industrial technology education should equip student with appropriate knowledge of concepts, principle, laws and conceptional schemes knowledge of scientific and mathematical processes and skills knowledge of teaching skills and method knowledge of testing and assessing student level of learning.

To achieve the learning outcome in all programme in science and technical education and technology education and the stated goal of the technology education we must have a curriculum that met the need of our present society.

Concept of Curriculum

Curriculum is a contextual guide to the organisation and implementation of educational programme to be implemented in a systematic and sequential order. It is designed, developed and review in line with the philosophy and objectives of the programme as well as immediate society. UNESCO (2011), sees curriculum as a document that consists of a statement of aims and objectives of content in terms of theoretical knowledge, practical skills to be acquired materials to be used in its presentation as cited by Raymond (2019).

In addition, Doll (1978) in Akinseinde (2004) defined the curriculum of a school as the formal and informal content and process by which learners gain knowledge and understanding develop skills and alter attitude appreciation and value under the auspices of that school Wostczak (2002) in Arowolo (2010) posited the curriculum is an educational plan that spells out which goals and objective have to be achieved, which topics should be covered and which method are to be used for learning, teaching and evaluation. Also Tanner and Tanner (1995:158) in common wealth of learning (2000) defines curriculum as a plan or programme of all experience under the direction of a school. In some vein Oantara (1990:8) in common wealth of learning 2000, opined that curriculum is the totality of the experience of children for which schools are responsible.

The institution responsible for the curriculum of Nigeria university programme is national university commission while Nigerian certificate in education programme is under the control of national commission for colleges of education and national board for technical education is responsible for polytechnics and technical colleges. These bodies develop the curriculum in form of minimum standard for the respective levels of educational institution to fulfil and advance it to their society tests and the technological advancement for their graduates to add value to their society. This is reflected in the content of the curriculum which is broken down presenting to the student.

However the content of the curriculum that are in line with the objective of every particular programme are documented as course structure and course synopses. While course structure itemises the course titles course code credit unit and status the course synopses breaks down the course title into major sub headings of the course tittles.

Industrial And Technology Education Programme In Nigeria

History of the Department of Industrial Technical Education

The department of industrial technical education was established in 1962 by ford foundation. The department of industrial technical education is made up of the following sections: Building woodwork technology electrical/electron technology and motor vehicle/mechanical technology. The department of industrial technical education in Nigeria. As a result almost all the institutions that run technical education in Nigeria at university, polytechnic and college of education levels are administered by the products of this department.

The department offers both under undergraduate and postgraduate programmes in industrial technical education. The department has produced competent and technically skilled teacher that work in all sphere of life in Nigeria and other part of the world.

Philosophy and objectives of technology education programme in FRN (2018) are

6. To enable student to acquire necessary teaching and practical skills and other aspects of methodology of teaching their subjects
7. Help student to become industrial effective classroom teachers
8. Expose student to industrial applications of their subjects
9. Acquire the ethic of teaching as a professions
10. Become professionals science and mathematics teacher
11. Disseminate information in technical education and industrial technology education to the society
12. Develop necessary laboratory skills and
13. Develop positive values and attitude for efficient discharge of their duty as teacher.

ITE – Job Opportunities: -

Graduates of the degree programme in industrial technical education will obtain employment as teachers in secondary schools, Technical College, Polytechnics and Colleges of Education. The programme is geared towards the fulfilment of the need for professionally qualified technical teachers who can impart technical knowledge and vocational skills to their students and industries thereby contribute to the economic development of Nigeria. The following secondary and technical school subjects will be taught by graduates of the various programme in Industrial Technical Education: Introductory/basic Technology in junior secondary schools, Technical drawing ,Woodwork, Metal work, Applied Electricity ,Electronics Building construction and Auto-mechanics in senior secondary schools and technical colleges.

Challenges in Implementing the ITE Curriculum in Universities

- Curriculum Implementation: - this involves helping learners to acquire knowledge as well as experience. It is important to not that curriculum implementation cannot take place without the learner (COL, 2000). The teacher is the central figure in the curriculum implementation process. Implementation takes place as the learner goes through the intended experience knowledge, skills, ideas and attitudes that are aimed at enabling him/her to function effectively in society. However, the implementation of ITE curriculum is not free from challenges.

- Challenges in implementing the ITE curriculum in Nigeria universities are synonymous, with the problems of TVET in Nigeria and also that of general education in Nigeria. Egwu,(2009), posited that some of the major challenges of the Nigerian university system includes;

1. Institution related factor such as unstable academic calendar, inadequate collaboration between tertiary institution and organized private sector, inadequate and obsolete infrastructure and equipment, for example poor equipped ITE workshop and libraries, dilapidated classroom blocks, and weak support structure for students Industrial Work Experience Scheme (SIWES).

2. Human resources related problems such as brain drain, human capital flight, unattractive conditions of service for teachers, and staff shortage across board.

3. Government related challenges such as inadequate funding of tertiary institution.

4. student related challenges such as cultism, examination malpractice, social and academic vices (Egwu 2009).

However, Udoka (2010) opined that the major challenge is funding. In the same vain, Yusuf and Soyemi (2012), posited that inadequate financing is one of the problems of implementing ITE curriculum in ITE institutions. Furthermore, Okorofor (2010), also noted that, some of the problem of implementing ITE curriculum include.

iii. Lack of sponsorship: managers of educational institutions find it difficult to sponsor the ITE lecturers to seminars, conference and short courses claiming that there is lack of fund. This has affected the rate at which the ITE lecturers are upgraded.

iv. Inadequate infrastructure: ITE lecturers do not have the opportunities to act what they have learnt into practice due to lack of infrastructure.

v. Inadequate training: Time should be provided for ITE lecturers to go and upgrade themselves. Work load should not be so demanding that they preclude ITE lecturers from research and time to develop new skills, abilities and knowledge through research and innovation.

vi. Lack of reward for excellence.

More so, Ekpenyong (2011) in Ayomike (2013) posited that, there are a number of factors, which have in various proportions impeded the smooth implementation of the goals and objective of Technical and Vocational Education and Training (TVET) and ITE. According to the National Board for Technical Education (NBTE, 2011), the underlining challenges of TVET sector include: Low societal recognition, which translate to low enrolment and inadequate skilled workforce, obsolete instructional facility, inadequate finding, poor staffing, poor linkages with industry and general deficiency in quality. In addition, evaluation in all sectors of education tends to be by conventional examinations, which generally does not factor in practical techniques in the industry.

Universities Curricular Industrial Needs And Graduate Unemployment In Nigeria

It is believed that Nigeria graduates do not possess the requisite skills needed by the industrial sector of the economy which is why they find it difficult to get jobs. Et al (2008) argue that as result of many years of neglect higher institution in Nigeria lack of the tools needed to inculcate in the student the skills needed by employer and this is applicable to all discipline. In the same vein, Daabalen et al. (2000) submit that most curricular of Nigeria universities have little or no practical relevance to Nigerian economy. This is because teaching in Nigeria universities is theory oriented with little or no practical training. The revolution information technology is a good case in point which has revealed the miss match between the skills needed by employers compare to the skills possessed by the Nigerian graduates. It has been observed that many graduates employed in the industrial sector are incapable of technical solution expelled of individuals having their levels of training/Anyanwu and Iloeye, 1998; Ugwuonah and Omeje 1998. as a result of this development Daballen et a (2000) contend that employer of labour have to put their recruits through intensive training after employing them before they can discharge the responsibilities they are employed for. This is taking toll on the profitability of the industries concerned. Idu (2014) in his own view emphasizes the need to change the curricular of Nigerian universities completely by making them national development oriented. He stated that many universities are still operative with the curricular they started with.

Knowledge and skills acquired by student of Nigerian universities do not meet industrial requirement and the wide economy. This mismatch, in addition with inadequate training in critical skills areas like problem solving analytical thinking and communication combined to exacerbate the unemployment status of graduates Nigerian universities. Similarly the authors observed that employers see graduates problem solving and creative thinking skills not to be adequate to perform the task required on the job. Suffice to say that employer perceive graduate of Nigeria universities to be more academically oriented while deficient as far as awareness on latest development and skills applicability in concerned.

Little wonder that vidanapathirana (2001) contend that people are unemployed because of unemployment mismatch. Some of the factors the authors harped on as responsible for graduate unemployment included the fact that graduate lack the required competencies knowledge skills and experience caused by inflexible curricular and teaching methods among others. Uche and Kpee (2007) also observe a disconnect between universities don academic and industry and conclude that dons produce while elephant collar curricular usable only fork white elephant collar jobs. This situation reinforces Akano (2009) statistics that 7 out of 10 Nigerian graduates are unemployed.

Others believe that the problem of graduate unemployment should not be heaped on curriculum as universities are expected to review their curricular every five years (Bahsir, 2014). Authors like Idu (2014) argues further that through some universities do review their curricular every five years but stated that many of them are not really doing it well.

Conclusion

This paper examines the curriculum of ITE programme: the challenges of industrial demand; with a particular focus on Nigerian universities. The paper show the mismatch between universities curricular and industrial needs which is a major factor responsible for graduate unemployment in Nigeria. And it is clear that the current student and graduate student are not satisfied with the current teaching and learning. As there are a number of factors that cause unemployment among the graduate in the job market there should be an immediate action taken by the bodies responsible for developing the curriculum. They need to ere-engineer the current curriculum to supply quality graduates to satisfy the current curriculum to challenges of industrial demand.

Recommendation

I. Universities and government should have a good working relationship so that universities will have a stable academic calendar, adequate and function able infrastructure and equipment as well strength the relationship with non governmental organisation.

II. Universities should employ competent staffs academic and non academic implementation or the curriculum for proper government should increase the founding of the university programme and strictly monitor how universities uses the money given to them.

III. The universities and government should reinforce strict rules and regulation regarding cultism, examination malpractice and other academics vices.

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SKILL IMPROVEMENT NEEDS OF LECTURERS FOR EFFECTIVE TEACHING OF AUTOMOBILE TECHNOLOGY EDUCATION IN NORTH CENTRAL NIGERIA.

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Abstract
The study is designed to identify the areas of skill improvement needs of lecturers for effective teaching of automobile technology education (ATE) in north central (Federal University of Technology Minna, Niger State, Federal University of Ilorin. Kwara State, Federal University of Jos, Pleatue and Benue State University Benue.) Nigeria. Three research questions were used to guide in the conduct of the study. The lecturers of ATE programme in north central, constitute the respondents of the study. A 22 item questionnaire was used to collect data for the study. The data was analysed using frequency counts, mean and standard deviation. The analysis of the data revealed that ATE lecturers in the institution need skill improvement training in terms of repairing and maintaining starting and ignition system, automatic wheel balancing and alignment as well as engine diagnostic and turn up areas in ATE. Base on the finding the following recommendations were made; immediate skill improvement training need in 41 innovations including Automatic wheel balancing and alignment, engine diagnostic and turn up as well as repairing and maintaining starting and ignition system for the ATE lecturers with emphasis in the areas of instructional and technical skills. There should be collaboration between the lecturers and the industries to enable the ATE lecturers to acquire the needed skills to impart to the learners so that upon graduation the students can be employable to contribute to the development of their immediate society and the nation at large.

Introduction
Skill is the ability and capacity that is acquired through deliberate, systematic, and sustained effort to smoothly and adaptively carryout complex activities or job functions involving ideals (cognitive skills), things (technical skills) and / or people (interpersonal skills). According to Speelman (2005), a skill is seen as ability to do something well, usually gained through training and experience. Skill is often acquired after a training session or after practical exposure. Skills in the view of Etonyaku (2010) refers to as ability to put into use, acquired competencies, attitudes and behaviour after an exposure to theories and practices inherent in the field of study. It was further stated that skill is the capacity of a person to accomplish a task with desired precision and certainty to make a productive business or enterprise. Farlex (2013)

emphasized that a skill is a proficiency, facility or dexterity that is acquired or developed through training or experience. Improvement is considered as attaining a better state from the identified former state, through some action intended to bring about measurable achievement. Improvement in general, means "gradual, piecemeal but cumulative betterment" which can refer to both individual and society as a whole.

Automobile technology remains an area which involves the application of scientific knowledge in the design, selection of materials, construction, operation and maintenance of the automobile (Mohammed, Momoh, Idris& Raymond, 2017). According to Giri (2013) Automobile is a self-propelled vehicle used for transportation of goods and passengers on land. Automobile is referred to as a self-propelled, trackless, non-articulated, four wheeled land vehicle, taxi, and buses used to transport people and goods from one place to another (Gartman, 2004). Automobile technology education is an aspect of educational programme offered at higher institution of learning which prepares students for career in automobile enterprises (Idris, Mustapha, Beji, Gabriel, Jiya, Kolo & Audu, 2016).

The need for improving training skills (in service training) in institutions is getting more attention for lecturers and instructors to be equipped with new knowledge and skills for them to face new challenges and reformation in educational field. Skill improvement training can enhance the professionalism of teachers who can contribute to the organization to achieve its goals. Skill improvement training is a professional and personal educational activity for teachers to improve their efficiency, ability, knowledge and motivation in their professional work. According to Kazmi,Pervez and Mumtaz (2011), the training for teachers enables the teachers to be more systematic and logical in their teaching style. Skill improvement training is a planned process whereby the effectiveness of teachers collectively or individually is enhanced in response to new knowledge, new ideas and changing circumstances in order to improve, directly or indirectly the quality of learners' education. Studies by Ekpoh,Oswald and Victoria (2013) shows that, teachers who attend re-training programmes perform effectively in their work concerning knowledge of the subject, classroom management, teaching method and evaluation of students. Studies by Jahangir, Saheen and Kazmi (2012) also shows that training plays a major role to improve the teachers' performance in school.

According to Frederick & Stephen (2010), during the training, teachers with schools management skills, evaluation techniques and mastery deliver on content of their areas of subject matter. For this reason, teachers and educational experts should increase their effort in fostering and implementing and continuous training in institutions so as to improve the effectiveness in the delivery of the required content. Ronald (2004) postulated that it is literally impossible today for any individual to take on a job or enter a profession and remain in it without any changes.

Therefore, it is not only desirable but also an activity to which every technology institution must commit human and fiscal resources if it is to maintain a skilled and knowledgeable staff". (Ronald, 2004:170) The importance of skill development should be looked in various perspectives. It promotes a very flexible environment and allows lecturers to adapt with the working situation and it is also one form of motivation for employees or employers and it will continue to increase creativity in teaching and learning process. It also enables teachers to acquire new understanding and instructional skills to develop their effectiveness in the classroom. Skill development for lecturers should have a positive effect on their knowledge and communication, with their involvement in planning instructional activities and also it increased the students' motivation. Besides, the lecturer needs to improve their skills in automobile technology in order to provide them with ample opportunities to learn new concepts, methods, skills and approaches through professional development. Skills improvement needs of lecturer also change their attitudes and further increase the performances of students.

The purpose of this study is to improve the skill needed by the lecturers for effective teaching of Automobile Technology Education in North Central Institutions offering ATE courses in Nigeria.

Statement of the problem

The automobile technology education lecturers have complex role and have more demands on them in order to be able to impart knowledge and skills to the students. Therefore, the lecturers need to acquire new knowledge, skills and attitudes for them to function effectively on the job. One of the major challenges facing Technical and Vocational Education Training (TVET) today in Nigeria is that, most of the technology teachers especially ATE lecturers lack appropriates facilities and partially lack practical (Udofia, Etal., 2012). It is also the belief of many educators that pre-service training of lecturers is not sufficient to prepare teachers for life (Okobia, 2013). It has been argued that only through the growth of training and retraining that the gap between advancing knowledge and practice can be bridged. It was on the basis of this that the Federal Republic of Nigeria (FRN) in the National Policy on Education (FRN, 2004) emphasized that training and re-training of Lecturers shall be developed as an integral part of continuing teacher education and shall also take care of all inadequacies. The acceptance of such responsibility by the government is a right step to ensure effectiveness and quality teaching and learning. However, quality education depends on the quality of the teachers. Skill development of lecturers ensures that they are kept up to date and adequately empowered to provide effective teaching and learning to the students.

The pre-service training, might not perfectly prepare them for effective job performance. Therefore, many reasonable teachers sought the opportunity for skill improvements as a means of further professional development. It is against this background that this study was aimed at determining the skill improvement needs of lecturers for effective teaching of automobile technology education at North Central of Nigeria.

Objectives of the study

Specifically the objective of the study are to determine the skills improvement needs of lecturers;

iii. in repairing and maintaining automobile system such as starting and ignition system.
iv. in automatic wheel balancing and alignment.
v. In engine diagnostics and tune up.

Research question

- What are the skill improvement needs of lecturers in repairing and maintaining starting and ignition system?
- What are the skill improvement needs of lecturers with respect to automatic wheel balancing and alignment?
- What are the skill improvement needs of lecturers and with respect to diagnostics and tune up?

Methodology

The study adopted a descriptive survey research design to elicit information from automobile technology lecturers in north central universities offering ATE in Nigeria. Descriptive survey research design in the view of Nworgu (2006) is the study which aims at collecting data on, and describing in a systematic manner the characteristics, features or facts about a given population. The design was deemed appropriate since data was collected to identify areas of skill improvement needs of lecturers for effective teaching of ATE at university level. The study was conducted in North Central of Nigeria. The population of the study consists of 25 ATE lecturers in north central of Nigeria in the area of the study. The choice of the population was based on the fact that they are knowledgeable and therefore, in a very good position to give authentic information on the skill improvement needs of lecturers for effective teaching of ATE at Universities level. A structured questionnaire was the instrument utilized to elicit the required data from the respondents for the study. This was developed by the researchers from extensive review of literature and based on the objectives of the research. The instrument was face validated by three experts from the Department of Industrial and Technology Education, Federal University of Technology Minna, Niger State Nigeria. To determine the reliability of the instrument, it was pilot-tested on three (3) respondents from department of Science and Technology Education in Bayero University Kano, that were not part of the study. Then, Cronbach alpha was used to determine the internal consistency and it yielded a coefficient of 0.84 for research question one (1) (What are the skill improvement needs of lecturers in repairing and maintaining starting and ignition system) , 0.75 for research question two (2)(What are the skill improvement needs of lecturers with respects to automatic wheel balancing and alignment?) and 0.65 for research question three (3)(what are the skills improvement needs of automobile lecturers with respects to diagnostics and turn up) Thus the instrument was considered appropriate for use by the researcher, the overall reliability coefficient of the instrument is 0.81. The questionnaires were administered by the researchers and the entire instruments were retrieved and analysed. A five (5) point rating scale was used to determine the level at which competence is needed. The decision rule was based on theory of true class limits of numbers with numerical values ranging between 4.50 –5.49 = Very Highly Needed (VHN); 3.50 – 4.49 =Highly Needed (HN); 2.50 – 3.49= Needed (N); 1.50 – 2.49 = Moderately Needed (MN) and 0.50 – 1.49= Not Needed (NN). Therefore, the mean responses of

Presentation and analysis of data

The data were presented and analysed based on the research questions posed in the study.

Interpersonal skills requirement

Research question 1: What are the skill improvement needs of lecturers in repairing and maintaining starting and ignition systems?

The mean ratings for items on the required skills are given in Table 1.

Table 1: Mean rating and standard deviation of the respondents on the skill improvement needs of Lecturers in repairing and maintenance of starting and ignition system.

No	Item statement	X 6	SD	Remarks
1	Assembling starter motor components appropriately	4.55	0.77	Very highly needed

2	Determine the serviceability of components e.g amature on the growler, starter motor e.t.c	3.50	0.72	Highly needed
3	Bench test starter motor.	4.00	0.65	Highly needed
4	Diagnosing of common coil ignition system faults.	3.33	0.68	Needed
5	Faults tracing in transistorized ignition system.	2.65	0.70	Needed
6	Rectification of transistorized ignition system	4.60	0.55	V. highly needed
7	Dismantling of starter motor.	3.00	0.51	Needed
8	Servicing of starter motor	3.04	0.56	Needed
9	Assembling of starter motor	4.55	0.60	Very highly needed

Analysis of the result presented in Table 1 indicates the respondents' opinion on the skill improvement needs of lecturers in repairing and maintaining starting and ignition systems. The result of the data presented above revealed that all the 9 items are needed by the lecturers to improve effective teaching and learning of automobile technology programs in north central universities offering ATE in Nigeria with mean value ranging between 2.65-4.60.This showed that the mean value of each item was above 2.50 is the mean cut off point for the competencies needed by ATE Lecturers. The table also showed that the standard deviations (SD) of the items are within the range of 0.51 to 0.77; this indicated that the opinions of the respondents were not far from one another in their responses.

Table 2: mean rating and standard deviation of respondents on the skill improvement needs of lecturers with respect to automatic wheel balancing and alignment.

No	**Item statement**	**X**	**SD**	**Remarks**
		6		
1	Carryout wheel balancing with appropriate equipment.	4.70	0.65	Very highly needed
2	Carryout wheel alignment with appropriate equipment	4.30	0.71	Highly needed

3	Check all wheel nuts are fully tightened following the correct sequence alternating opposite sides of the wheel	2.82	0.52	Needed
4	Repair or replace the distorted wheel	4.51	0.50	Very highly needed
5	Gauge the pressure of the tyres	3.32	0.61	Needed
6	Check the tyres for possible distortion	4.02	0.55	Highly needed
7	Identifying the position where the weight will be fit to make the tyre to be balance using automatic wheel balancing machine	4.05	0.64	Highly needed

The information presented in Table 2.0 reveals the respondents' view on the skill improvement needs of lecturers with respect to automatic wheel balancing and alignment. The respondents are of the believed that ATE lecturers need skills improvement in almost all the items listed in the table with mean value ranging between 2.85- 4.70. This indicated that the mean value of each item was above the 2.50. The table also shows that the standard deviations (SD) of the items are within the range of 0.50 to 0.71; this indicated that the opinions of the respondents were not far from one another in their responses.

Table 3: mean rating and standard deviation of respondents on the skill improvement needs of lecturers with respect to engine diagnostics and turn-up.

No	Item statement	X 6	SD	remarks
1	Discovering of under the hood noise	4.20	0.82	Highly needed
2	Carryout cylinder leakages test	4.83	0.67	Very highly needed
3	Carryout cylinder compression test	4.00	o.59	Highly needed
4	Carryout cylinder power balance test	2.52	0.52	Needed
5	Carryout oil pressure test	3.79	0.63	Highly needed
6	Carryout engine vacuum test	3.42	0.72	needed
7	Carryout troubles and time up	4.21	0.76	Highly needed

The information presented in Table 3.0 reveals the respondents' view on the skill improvement needs of lecturers with respect to engine diagnostics and turn up. The respondents are of the believed that ATE lecturers need skills improvement in almost all the items listed in the table with mean value ranging between 2.52- 4.83. This indicated that the mean value of each item was above the 2.50. The table also shows that the standard deviations (SD) of the items are within the range of 0.52 to 0.82; this indicated that the opinions of the respondents were not far from one another in their responses.

The respondents totally agreed that ATE lecturers need improvement in all the items highlighted in the tables. Consequently, the summary of the analysis only suggest strongly that ATE lecturers need further professional skill improvement in the institutions with respect to practical skills. Based on the findings from the study the discussion is made.

Discussion

The acceptance of the fact that all the competencies highlighted in Tables are needed by ATE lecturers did not come as a surprise. This only confirms the views of Fafunwa (1995) who noted that most Technical Vocational Education (TVE) teachers, especially ATE lecturers have insufficient and inadequate knowledge of their subject matter which render them incapable to perform their functions of imparting knowledge to the learners efficiently and effectively. Gyallesu (1992) also asserted that, the success of any educational system no matter how well it is planned depends to a large extent on the quality of teachers. The researcher observes that the greatest obstacle encountered in the institution especially in the Industrial technology education department is the use of lecturers who are inefficiently prepared or who are not professionally skilled. Lecturers must have an in-depth knowledge of pedagogy of teaching to be able to bring about desirable learning in the student entrusted to him, his knowledge notwithstanding.

As deduced from Muhammad (1995) ATE lecturers in the automobile technology education need continuous skill improvements in new innovation in automobile technology and consequent inclusion in the automobile technology curriculum. This requires that lecturers be exposed to new methodologies and curriculum innovation in their areas of specialization during the course of their training and continuous personal development programme. Continuous improvement of the lecturers will enable them overcome the areas of inadequacies in terms of curriculum changes and innovation. The fact that most ATE lecturers are ill-equipped professionally makes it very difficult for the objectives of the programme to be realized. In-line with this Okeke (1989) stressed that, teacher's knowledge of the above objectives and the necessary experiences will go a long way to helping him select the learning experiences capable of developing skills, abilities, understanding, habit, attitude and appreciations among students, which they will need to meaningfully, enter and progress in employment. Where the lecturers and instructors lack such basic knowledge, his students are likely to be ill-equipped. This seems to be the situation in our institution today.

In order to achieve the objectives of technology education a teacher needs to be very sound in both subject matter and the pedagogy of teaching. A competent teacher show how best to derive the aims and objectives of a lesson, prepare the lesson plan, select teaching resources and methods, present the lesson, manage the classroom and evaluate the lesson. Apart from these competencies that are expected of the teacher; he should also be aware of present day research and development in instructional technology and should whenever possible participate in seminars, professional conferences, project work concerning teaching and learning process and problems relating to his area of specialization (Adigun, 1998). On this note, the teacher should keep an open mind for all new ideas and examine them critically and he should also realize that his task is not merely to teach but also help students to acquire skills, attitudes, habits of thoughts and qualities of character that will enable them function effectively in the society.

Conclusion

This study sets out to determine the skills improvement that are required by ATE lecturers in North central based on the current occupation demand perceptions. The data support the conclusion that lecturers are not equipped with adequate interpersonal, instructional and practical skills. As a result of the above revelation, the following implications arise. Lecturers of ATE programme in the institutions needed continuous skill acquisition to enable them to perform their professional responsibilities in their practice. The pre-service training received by the lecturers was found to be rickety and completely defective, which might not perfectly prepare them for effective job performance. The ATE lecturers need to be developed in order to update their knowledge, skills and competencies with respect to skills improvement to be able to teach the learners efficiently and effectively, so that the learners can graduate as competent craftsmen, technicians and technologist.

Recommendations

Based on the findings of the study, the following recommendations are made in order to improve lecturers' skills for them to be able to perform effectively on the job.

• There should be linkage programme between the lecturers and the automobile industries by using some of the experienced supervisors in the industries as lecturers in order to train the ATE lecturers to be able to acquire needed practical skills so that they can teach the students effectively.

• The Nigerian universities and polytechnics offering courses in TVET especially automobile technology programme could play a vital role in the retraining exercises especially during long vacations.

• A systematic programme in the universities and the polytechnics should be drawn for the retraining of A TE lecturers for a period of three years, utilizing the vacation periods, for serving lecturers which will go a long way to equipping them qualitatively.

• The emphasis in retraining should be in the areas of practical skills in the deficient areas as well as the requisite instructional skills.

• The institutions and local automobile industries should collaborate to organize seminars and workshops where they will share information on the changing trends in the automobile industries with respect to practical and how these changes can be incorporated into the curriculum of the schools.

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THE PROSPECTS AND CHALLENGES OF ELECTRICAL AND ELECTRONICS TECHNOLOGY TEACHERS IN NIGERIA

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Abstract
This paper examined the prospects and challenges of electrical electronics technology teachers in Nigeria. It discussed in details three main challenges that have to do with the curriculum, teaching and learning methods as well as infrastructural and equipment deficit. The paper discussed how the current curriculum does not meet the requirements of dynamic nature of electrical electronics electrical electronics equipment. The paper advocates that the curriculum should reflect real world practices. It also pointed out the need to examine alternative teaching and learning methods. This is because the traditional teaching method in Nigeria will probably not be adequate to equip the future electrical electronics engineering and technology graduates of the necessary skills that would be required to achieve success for practice in the industry.

Introduction

Electrical electronics technology as a field of study in technology education play a vital role in almost all aspect of human endeavor such as transport system, communication system, electric power generation, industries and power tools and equipment, health care system, defence, agriculture, commence, and educational system just to mention few of them (Kenneth 2014). It involves the teaching of some abstract concepts such as atomic structure, flow of electrons, power generation, transmission and distribution, circuit design, electromagnetism, logic gates, circuit theory, amplifiers among others. These require higher order thinking for comprehension. Electrical electronics students most times have challenges in understanding some of these concepts and formulas, especially topics that involve complex calculations such as circuit theory, Boolean algebra etc.

Traditionally, the role of the teacher has been as a custodian and giver of information, the teacher was a "spring" from which knowledge flows. Teaching was simply the act of imparting instructions to the learners in a class-room situation. But researches into the ways people learn have changed the narrative. Wankat and Oreovicz (2015), see teaching as a complex human activity which requires knowledge about the subject being taught, the curriculum, appropriate teaching and learning strategies and about the abilities, interests and personalities of the learners. This notion makes it almost impossible to develop a formula which guarantees excellent teaching of all subject areas because teachers' practice is informed by the many and varied events that they will have experienced.

Technology education is clearly seen as a form of education for the development of industry as well as practical skills (Schultz, 1996). It is that aspect of education that prepares an individual for the acquisition of practical skills to earn employment. It involves skill application that utilizes scientific knowledge. It is a study of technology which provides an opportunity for teachers and students to learn about the processes and knowledge related to technologies that are needed to solve problems and extend human potential (ITEA, 2000). Here, human ability is used to shape and change the physical world to meet needs, by manipulating materials and tools with techniques.

Technology education develops interest and curiosity among the students. It provides not only theoretical knowledge to the students but also make them professionally skilled in subject by providing practical knowledge.

It is against this background that, the paper set out to examine the prospects and challenges of teaching electrical electronics technology in Nigeria. It will look at the curriculum, teaching and learning methods, equipment and infrastructure in electrical electronics technology education in Nigeria. It will also consider the strategies for enhancing the teaching of electrical electronic technology education for sustainable development.

OVERVIEW OF ELECTRICAL ELECTRONICS TECHNOLOGY EDUCATION IN NIGERIA

Technology education is generally designed to bring about industrial development which in turn is a key player in economic development (Silvius and Bohn, 1976). This means that, the world of industries ought to be the source of instructional content for technology education curriculum. Technology Education in Nigeria is offered in Universities, Monotechnics, Polytechnics, Colleges of Education (Technical) and other specialized institutions. One of the goals of Technology education in Nigerian tertiary institutions is the provision of courses of instruction and training in engineering, other technologies, applied sciences, business management, leading to the production of trained manpower (NPE 2013). The study of any technology degree in Nigeria is structured for a five-year period, with the first year spent studying general sciences. In pursuance of this goal, the policy stipulates that government shall adopt measures to develop and encourage ideas of technology education through students' exposure to practical industrial work experience.

Electrical technology deals with all machines, tools, devices, and systems in which a current or a flow of electron takes place through conductors and metals. It involves the design and development of high-voltage systems and components such as motors, generators, heaters, electrical power transmission and distribution systems, radio wave and optical systems, converters, and control systems for operating light and heavy machinery (Tom, 2007). Electrical technology however, not only involves the design and production of all the electrical systems mentioned, but also the installation, testing and maintenance of these systems. According to National Board for Technical Education (NBTE, 2004) electrical technology is an area of specialization in industrial education. It includes such areas as construction, installation, panel building, repair and rewind, instrumentation, maintenance and highway electrical systems. In the technical college, electrical technology trades include Electrical Installations and Maintenance Works, Appliances Maintenance & Repairs.

Electronics technology is an aspect of technology education. It is the application of scientific knowledge in the design, selection of materials, construction, operation and maintenance of electronics (Theraja & Theraja, 2001). Electronics technology is concerned with the design, manufacture and application of electron tubes and solid-state devices, transistors and diodes (Grob & Schultz, 2005). These devices, he went further, are found in such diverse applications as home radio, and television, wire or communication, radar, notable in detection, location and control of ships and aircraft electric power, distribution and control; X-ray production, industrial process control and numerous aspects of national defense.

CHALLENGES IN ELECTRICAL ELECTRONICS TECHNOLOGY EDUCATION

Electrical electronics technology according to Chukwuedo and Omofonmwan (2013), is one of the core areas of specialisation in the technical education programme which prepares learners for teaching and industrial engagements, through the provision of knowledge, skills, and attitudes desirable in the world of work. For teaching and learning process to be effective, it must appeal to the cognitive, psycho-motor and effective domains; teaching electrical electronics skill can however be viewed as basic, cognitive, psycho-motor or manipulative, occupational, transferable and process. In Africa and Nigeria in particular, the training of technical personnel in electrical and electronics technology has generally witnessed formidable challenges which include lack of effective electrical electronics technology education curriculum, inadequate basic knowledge by the students, an explosion in enrolment of students, difficulties in students recruitments, inadequate facilities for teaching of technology education, lack off or inadequate school industry linkages, lack of basic infrastructure, inadequate funding of education, lack of special remunerations to engineers and technologists, teacher-to-student ratio and the use of ineffective teaching methods, poor access to internet services, irregular power supply, lack of good leadership and mentoring schemes. (Teferra & Altbachl, 2014). These challenges are having a significant impact on the quality of teaching and learning electrical electronics technology.

Electrical Electronics Technology Education Curriculum in Nigeria

Curriculum is one of the most important components of implementing any education policy as it describes the syllabus, teaching methods employed and ultimately, it would determine the learning experience**.** UNESCO (2011), defined curriculum as consisting of statement of aims and objectives in terms of theoretical knowledge, practical skills to be acquired, attitudes towards work and necessary support materials to be used in its presentation. Kofoworola (2003) described the current curriculum of technology education programmes in Nigeria as out of touch especially with what is going on in the industry. He however opined that curriculum should be able to create space to accommodate certain aspects of engineering applications that are prevalent in our environment today for it to fully support economic growth. Curriculum should provide dynamic tools for solving problems as the problems are equally changing from time to time. This implies that Technology education curriculum should be flexible in nature, examined frequently and modified in order to accommodate certain societal needs.

Similarly, Ojimba (2012) stated that one of the of the problems mitigating the teaching and learning any technology education subject in Nigeria is the curriculum, he noted that the curriculum of a subject with practical content is generally organized into an average of 67% for the theoretical classes and 33% for laboratories which is grossly inadequate. He further outlined some problems associated with the current curricula as:

i. They are based on a foreign model which has evolved under ideal conditions (staff, equipment, infrastructure, training opportunities etc) that are not easily duplicated in developing countries.
ii. There is a basic lack of textbooks in this area and most of the available textbooks are often illustrated with examples from outside the local environment and which are irrelevant to the particular country.
iii. There is usually a shortage of highly competent indigenous teaching and support staff with sufficiently wide practical experience of technology.

iv. The curricular are adjudged to be too academic and overloaded with intellectual content in pure science and mathematics at the expense of basic engineering and technology.
v. The teaching approach follows the conventional method of transferring knowledge across through the lecturer reading out to students, who would then take down notes.

Therefore, electrical electronics technology curriculum in Nigeria has not been able to provide the expected impact to meet the demands of emerging technologies and solve societal problems.

Teaching and Learning Methods

The central purpose of teaching is to effect desirable changes in the learner's behaviour, (Ogwo and Oranu 2006). This desirable change is termed learning. According to Tebabal and Kahssay (2011), the primary purpose of teaching at any level is to bring a fundamental change in students' learning. It is therefore, expected that teaching will cause desirable change in the learners' behaviour. Therefore, teaching should be seen as the integral part of any curriculum implementation as it would have a direct impact on the students' learning. Idris and Rajuddin (2012) noted that the teaching methods adopted by the academic staff of tertiary institutions in Nigeria are most frequently demonstration, students centred or lecture method. The situation is partly due to the difficulties to run experiments and run some tests required for the teaching and learning because of the absence of materials and equipment for practical training. Teaching methodology is still the conventional approach where a teacher delivers lectures by standing in the classroom, dictating notes or deriving equations from the 'old' notebook', recycling examples, assignments and projects. This type of approach does not allow skills acquisition, critical thinking and creativity needed in a challenging course like electrical electronics technology.

Equipment and Infrastructural Challenges

Teaching electrical electronics technology in Nigerian schools is constraint by lack of equipment and infrastructure. Ojimba (2012) observed that most technology education departments in Nigerian universities do not have laboratories or workshops space let alone usable equipment and facilities and where they exist, they are grossly inadequate, as the laboratories only have the items or equipment that were provided when the departments were established.

Chukwuedo and Omofonmwan (2013), opined that the insufficient supply, non-functional and/or lack of material resources such as tools, equipment and workshop have also limited the extent of skill acquisition in electrical and electronic technology programme because the school system lays more emphasis on the traditional classroom setting. The inadequacies in infrastructural and equipment according to Oloyede et al (2017) is because of inadequate funding of Nigerian universities. They further asserted that lack of equipment and necessary infrastructure like classrooms and teaching aid equipment and the major barrier to teaching and learning of technology education programmes.

From the forgone, it is obvious that the curriculum electrical electronics technology may not be able to achieve its goals,

The Prospects of Electrical Electronics Technology in Nigeria

It is evident that electrical electronics technology curriculum and its implementation must be able impart the relevant skills to the learners and also meet up with the sophisticated nature technology and the changing requirements of the society. A number of changes have to be implemented to improve the quality of teaching and learning electrical electronics in Nigerian schools. Some major changes that need immediate attention and how to go about these changes are discussed below:

Need for the Modification in Electrical Electronics Technology Curriculum

Any curriculum that would meet the need of the industrial practice has to change continuously. The forgone discussion suggests the need to overhaul the electrical electronics technology education curricula in Nigeria. The overhauling of the curricula may not necessarily translate to the production of highly literate technical education experts of ready-made graduates for the industry which may result in rapid industrialization or economic growth of the nation unless solutions are proffered to some constraints that may militate against positive outcomes, but will adequately equip our youths with the relevant skills needed for their daily living.

Teaching what is necessary in the real world

It has been established that the curriculum of electrical electronics technology in Nigeria is out of touch with what is happening in the industry. The technique needed for effective teaching and learning the subject cannot be fully taught within the four walls of the classroom. There is a need for interaction and reinforcement of the essential fundamentals that engineers and technicians would need when on the field. Technology education curriculum must provide increased practical experience which, according to Teferra and Altbach (2004), would help the students' ability to learn the abstract and theory that forms much of the engineering fundamentals. It also helps their ability to realise the applicability and practical usefulness of a good theory.

Use of innovative approaches to teaching and learning

Chukwuedo and Omofonmwan (2013) noted that, some enhancements that have been observed following the diffusion of Information and Communications Technology ICT into the teaching, and learning process and this creates some sort of modification on the process. They asserted that, there are quite a number of methods that could be used/or integrated in to the teaching method. The acquisition of skills in electrical electronics technology programme should be supported with sufficient ICTs in order to widen the skill-horizon of both teachers and students.

The use of simulation is another innovation which electrical electronics teachers could adopt. Simulation teaching methods use simulator or simulation scenarios, so that the participants can play a role in the near reality. Simulation method is a more practical oriented approach of teaching where students are exposed to devices and equipment physically. This method is considered as the most efficient in Science, Technology and Engineering related subjects as it's hasten and stimulates the understanding of learners. According to Dayong Huo (2015), this method combines with the scene teaching, field teaching, case teaching and other teaching mode. So many learning methods have been identified and associated with specific teaching methods. Learning methods identified includes: visual, auditory, sensing, inductive, active, creative and passive.

Where students do not have access to actual industrial experience, simulation method of teaching can expose the students to industrial practices and professional competence.

Recommendations

Teaching electrical and electronic technology in Nigeria is so challenging a traditional classroom or workshop cannot serve as the only means through which such skills should be taught and learnt. Teachers in Nigeria are faced with the challenges of inadequate curriculum, insufficient facilities and inappropriate teaching methods. Hence;

i. Curriculum planners in technology education should reform the current curriculum to reflect the current trends in electrical electronics equipment.
ii. There is need for electrical electronics teachers to be provided with training on new methods of teaching beyond the regular classroom and workshop.
iii. Government should equip electrical electronics workshops with ICT facilities.

Conclusion

This paper pointed out the need to examine alternative teaching and learning methods in electrical electronics technology. This is because the traditional teaching method in Nigeria will probably not be adequate to equip the future engineers and technologists with necessary skills in their trade

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EDUCATION AND NATIONAL SECURITY: CHALLENGES AND WAY OUT

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Abstract
From independence to date Nigeria has being battling with one form of civil unrest to the other ranging from communal , ethnic and religious violence to the farmers and herdsmen clashes. The situation has assumed a dangerous scenario with the emergence of the Niger Delta militants and the Boko Haram terrorist group. In all the violent conflicts, youth has been the cannon fodder in the hand of politicians or religious zealots in fomenting trouble in the land. The reason is premised on the high rate of unemployment among the youth which is a fall out of faulty educational system that renders Nigerian youth unemployable in the labour market. The economic predicament of the Nigerian youth has made them ruthless in crimes. The study examines the role of education in national security.The paper maintains that unless Nigeria's education is reformed in such a manner that will make youth self-reliance, then the end of insecurity perpetrated by youth is not yet in sight. The paper also advocates mass employment provision by government for unemployed youth as a measure to address Nigeria's problem of insecurity.

Keyword: Education, National Security, Youth, Unemployment, Insecurity.

Introduction

National integration covers all activities and arrangements put in place to ensure free movement, mixing and interaction of a people of a nation with other people of the same nation without any form of gender, racial, tribal or religious discrimination. Happenings in recent times in the nation have once again called for sober reflection by all particularly, in view of the dynamics of our federation. National security is in jeopardy. Insecurity comes in different coloration and magnitude among which include the spate of bombings in some parts of the country, election related crises, kidnapping, human trafficking, militancy, assassination, hunger, armed robbery, environmental degradation and other untoward acts now being experienced in the country. All these have thrown up the need for all and sundry to be more retrospective, introspective and proactive on issues of national security so as to arrest this negative drift currently impacting our national psyche. Some of these security issues have been with us for sometimes now without fizzling out despite concerted efforts to the contrary. There is therefore the need to try the education option as a panacea for assuaging the drift thereby guaranteeing national security.

Education has been defined as a process by which individuals are assisted formally through proper direction and guidance to develop their capacities for their own benefit and that of the society (Okeke, 2003). It is geared towards developing the individuals for them to live effectively and efficiently in the society and to contribute to its advancement and upliftment. Hence, through education the behaviour patterns of the citizens could be changed in the desired direction. In other words, with sound education people will start to understand and appreciate one another better and try to restore the dignity of man. Hence, we have to recognize the role education plays in equipping individuals with requisite knowledge and skills for survival and societal progress. Successive Nigerian governments have evolved different policies and programmes to promote education and develop the nation's human resources, (Matawal, 2007). Often, these reforms in education fail to provide broad-based education in the development of the mind, in comprehending the environment and development of appropriate skills, abilities and competencies to co-exist with and contribute to the development of the society. It is meaningless to talk of development in the absence of national security. In other words, insecurity in a nation is a threat to development.

There is therefore, a nexus between national security and development. In a state of insecurity, development is as elusive as a mirage.

National security and challenges

National security is a top public issue today. It is a matter of national importance that should be of concern to all stakeholders in the Nigerian State and one that requires comprehensive and committed contribution of all groups and interests that make up Nigeria. National security cannot be narrowed down to defense and military might alone. It is wider than that. It is this narrow conception of national security that forms the basis for the disproportionate budgetary allocation of funds as the case is, to "ensure the security of lives and property", however, to the utter neglect of other equally important sectors of the economy that bear directly or indirectly on national security. Such sectors as education, health, agriculture etc become poorly mobilized. Iredia (2011) defined national security as the ability of a State to overcome any form of its challenges no matter what the challenge is. He averred that national security is wider than military might, defense or law enforcement and pointed out other rather basic dimensions like job, water and food security. It is appropriate therefore, to state at this juncture that a national security policy would be of no use to the unemployed and hungry citizens that constitute the majority of the population in a poor country like ours. To lay credence to the all inclusive nature of the meaning of national security, the American President Barack Obama in 2010 canvassed an all-encompassing world view in his own definition of America's national security interests which include, "a strong, innovative and growing U.S. economy in an open international economic system that promotes opportunity and prosperity".

Similarly, Abubakar (2005) averred that recent international debates have raised the need to see security in the broader sense as "the struggle to secure the most basic necessities of life such as food, fuel, medicine and shelter". This broader view of security from the perspective of human physiological needs is important for the attainment of physical and national security and overall peace and development, as social unrest arising from the absence of such basic-human security can indeed lead to security problems and conflicts. Apart from the socio-economic security challenges, Abubakar (2005) identified some of the major security challenges confronting the nation to include political and electioneering conflicts, ethno-religious crises, ethnic militias, boundary disputes, cultism, criminality and organized crimes. In the same vein, Oshio (2009) opined that Nigeria is today plagued with social disorder, insecurity, poverty, illiteracy, balance of payment deficit, poor health statistics, ethnic and religious conflicts, corruption, crime and criminality and political crises. All these mean that we are very insecure in terms of human wellbeing. The problems, individually and collectively constitute threats to the peace, security and development of the country. Invariably, they have implications for the continuity and survival of the nation's nascent democracy. Oshio was of the view that the term "national security" does not appear to lend itself to any precise definition partly because its nature and concept may vary from one state to the other. He however identified two main tendencies in defining it:

a. The first is the state-centered concept which views national security in terms of defense and survival of the state. This conception according him Equates “defense” with "security" and bestows its protection to the military as the custodians of national security and

ii. Equates national security with the security of the state. Iredia (2011) sees this conception as microscopic and quickly points out that national security cannot be equated to military might, defense or law enforcement alone. It goes beyond that to accommodate far more reaching issues. Elaborating more on this, Esiemokhai (2010) averred that in states where the interest of the ruling elite is put above that of the people, the police, the army and security formations are expected to defend the government, its personnel and its property.

b. The second tendency in the definition of national security, according to Oshio (2009), involves the factoring of the state and individual into the constituents of the definition. Here, security involves freedom from danger or threat to a nation's ability to protect its cherished values and well-being of its people.

This second conception takes into consideration the significance of human well-being in the security considerations of a country. In states where the people's welfare, well-being and wholesomeness are the paramount concern of the state, the government, determinedly weaves a security network around the people in the various villages, towns and cities. Oshio opines that it is advisable to view security in a state with nationality crises in terms of contending groups, organizations and individuals, as prime object of security. This dispenses with the narrow-minded conception of a national security primarily from its military- strategic dimension particularly in terms of defending its territory and sovereignty.

Recent social unrests in various African countries no doubt have roots in the failure of the government policies to provide or manage the basic human physiological needs of their citizens. In recent times, Nigeria has witnessed increasing number of security challenges that constitute threats to the cooperate, existence of its citizens and to the maintenance and survival of its democratic political system. These security challenges are diverse and complex, ranging from political disagreements to criminal activities with alarming dimensions and consequences. The spate of target bombings by the Boko Haram sect is a big security challenge to the Federal government, the affected states and the entire nation. This position was attested to by the declaration of Inuwa Bala (Borno State Information Commissioner) in a recent interview granted by the Daily Sun (2012) that "the Boko Haram issue is not just a Borno problem. It is a Nigerian problem, it is a sub-regional problem".

When Boko Haram first started their attacks in some parts of the North, some leaders explained away their actions but now, the stark reality seems to have dawned on all. The Boko Hararn crises are moving from one dimension to another, destroying human lives, properties and the economy of Nigeria. Major among them are the suicide bombing of the United Nation's building in Abuja, the Police Force Headquarters bombing, the 25th December 201I bombing of St. Theresa's Catholic Church, Madala in Niger State, the 2012 Easter bombing in Kaduna, the recent massacre of innocent students at college of Agriculture Yobe State and so many other target bombings and shootings in Kaduna, Kano, Bauchi, Plateau and Gombe states. Analysts are quick to blame the Boko Haram catastrophe on unemployment, hunger and deprivation. Specifically, the U.S government submitted that illiteracy, unemployment and inexorable demands of survival from the effects of poverty make the northern youths vulnerable and ready for recruitment into crime and social vices including terrorism of the Boko Haram genre.
The catalyst for violence in the Niger Delta, where the country's energy sector is concentrated could be grouped into two:

1. The indigenous populations dissatisfaction with their impoverished condition despite the wealth generated by the area's resources, and

2. The environmental degradation caused by energy- related development.

This disenchantment has spawned many militant groups prominent of them being the Movement for the Emancipation of the Niger Delta (MEND). MEND is seeking a more equitable distribution of Nigeria's oil wealth so that it benefits the local population, particularly the indigenous Ijaw tribe. In early 2006, MEND militias started attacking oil installations and kidnapping foreign oil industry workers in an effort to press home their demand. These actions led to a 20 percent reduction in Nigeria's oil production, and have since been short- circuiting the government's budgetary projection from the oil sector.

Another form of internal security challenge in Nigeria is sectarian violence. It has been estimated that this alone has wasted over 10,000 lives since 1999. Every little event triggers off suspicion, hatred and killing between the Muslims and Christians in the northern part of the country and among the various ethnic nationalities. For instance, the recent communal clashes in Nasarawa and Plateau States. Iredia (2011) citing the National Bureau of statistics, stated that there are about 35 million unemployed youths in the country who are forced to resort to anything that can serve as a means of livelihood. Former President Obasanjo in recent time raised the alarm that Nigeria may witness the type of revolution sweeping across the Arab world if nothing was done to redress the problem of youth unemployment. President Jonathan laid credence to this when he stated at the governorship election campaign in Lokoja that a revolution by the youths was imminent if elected public officials took no steps to initiate policies that would create jobs. Job security is important so that citizens can live meaningful lives and secure their homes, children, wives, ageing parents and other dependent relatives. Unfortunately, low priority which social security is getting now over issues like job creation shows that for us, prevention is not better than cure and we prefer to deal with the symptoms instead of the root causes of the challenges. There are also security challenges from food, water and health. National security starts with the social security component as represented by health care, food, shelter and clothing. The worsening economic conditions have been generating a mix of domestic, social and political tension. Governments are often expected to provide their citizens with political stability and socioeconomic security including health care and shelter. Lack of these basics often breeds discontents and social unrest. Tranquility and well-being of a society are necessary components of national security. Oshio (2009) observed that the Fundamental Objectives and Directive Principles of State Policy under the 1999 constitution of Nigeria contain many social- economic and political rights which, if fully implemented, would go a long way towards ensuring national security and development. These rights, he went further to state, are comparable to the Economic, Social and Cultural Right adopted by the United Nations General Assembly in 1966.

At the political level, desperate, intolerant and ruthless contests among politicians and their followers have often resulted in violence, security breaches, killings and destruction, all of which threaten the existence of the Nigerian State.

Kidnappings are now daily routine that attract little media attention or coverage unless high profile targets are involved. Armed robbery reigns in many parts of the country and big target hits like banks are not rare anymore. Land disputes and other ethnic upheavals have created a lot of security breaches in different parts of the country. To read our National Dailies is to read a "manifesto" on insecurity. All these have led us to where we are now today - mass poverty, insecurity of life and property, violent conflicts, armed robbery, kidnapping, poor quality of infrastructure and decay of social services.

Education and Nigerians National security

Education and security can influence each other positively or negatively depending on the context. This is necessarily so because it enables individuals, groups, countries and human race to explore, appreciate, understand and develop their physical and social environments for the satisfaction of their needs. An educated person has broad view of issues as against narrow and parochial outlook.

Education makes people to be tolerant of other people's religion, belief, culture, limitations and promote social harmony and security. It is ability to listen to almost anything without losing your temper or your self-confidence. A good number of conflicts often arise from ignorance and manipulation of ethnic and religious identity. In fact, education (not just passing through the four walls of the school) system produces tolerant and civil citizens who are able to understand and live with people from different ethnic, economic, religious and cultural backgrounds and other forms of identities. A country that bequeaths the right type of education to its citizens makes it difficult for such citizens to turn against their father land. In fact, it is meaningless to talk of security in the absence of the right type of education. It is therefore, not a surprise that Radda opines that education, when well imparted and utilized, has the potency of promoting national security. This is because it is mostly uneducated jobless and educated jobless youths that are easily attracted to crimes, thereby, constituting insecurity in a country. While Western education that is not geared towards self-reliance (education that makes youth job seeker) may be dangerous as far as developing countries are concerned, lack of Western education or low education is even more dangerous. Low education often translates to absence of competitive skill, adequate income, exclusion from participating in vital political and economic and social organizations and relations; lack of access to adequate food and nutrition, housing, health care and efficient public emergency and safety services-all which are element on human security. Youths who are educated have hope of better future than youths who are not educated and failed to learn any craft. Children or youths with low education are easily recruited as thugs, insurgents and terrorists through indoctrination. Suffice to say that lack of education itself is insecurity. Inadequate education also constitutes a problem to national security.

The former Minister of Education, Professor Ruqayyatu Rufai (cited in Orikpe, advocated for reform of the education system as a means of curbing security challenges confronting Nigeria. The Minister canvassed for total overhaul of the curriculum at all levels of education with the aim of providing recipients a kind of education that focuses on the development of the mind, soul and body, taking into cognisance the need of the country. In a nutshell, the Minister called for a synergy between the liberal education, vocational and entrepreneurship education. In the same vein, Yakubu submitted that, religious crisis, drug addiction, secret cults, armed robbery in higher institutions are either instigated or practiced and aided by the products of the system of education.

The high rate of unemployment among youth attests to the faulty premise of the Nigerian educational system. For instance, 4 observed that in 2008, 15% of the Nigerian workforce was unemployed and in 2011, the figure rose to 20% and the victims of this phenomenon are the youth who till date, still have the highest percentage of unemployment in the country. The authors added that there is a synergy between unemployment and poverty. Jega also argued that the numbers of unemployed youth in both rural and urban areas of Nigeria need little

motivation or mobilization to take part in riots and reprisal attacks given the inducement or opportunity for looting that often accompanied these. It appears poverty and joblessness especially amongst the youth is important casual and facilitating factors in violent conflict in Nigeria. Akinwumi also established a nexus between education and national security stating that, Nigeria's education system had increased rural-urban migration, and that many of the young people had migrated to different urban centres in the country to look for jobs that do not exist. This resulted into disappointment and frustration. Many of them take to crime to survive.
Thus, unemployment has been the cannon fodder in the orgy of violence and violent disorder in the country. This is because unemployment exposes people to poverty and the twin problems combined to provide a fertile ground for activities that constitute a threat to national security. The rise in crime rate is a direct consequence of unemployment and poverty. As stated before, most of the people paraded as criminals by the law enforcement agencies before the mass media in the country are mostly unemployed youths. They are also use as suicide bombers by terrorist groups in the country.

Although it is disturbing for educated youth to get involved in crime as a result of unemployment brought about by inadequate educational curriculum that would have made them job creators instead of job seekers, it is even worse for uneducated youths who refuse to learn any trade and as such, lack means of livelihood. Awake in Akwara et al. pointed out that poverty and inequality trigger violence and that 90% of all violence-related deaths are traceable to world's less prosperous nations: and the poorer neighborhoods of cities are often high crime areas. Similarly, Akande and Okuwa averred that, youth unemployment is a major factor in African conflict experiences including Nigeria. The prevailing socio-economic environment entices youths to turn to war, crime and violence as a means of livelihood. As bad as the situation appears, education can be used to curb the ugly trend. The next section detailed the way out.

Conclusion and recommendations
From the analysis above, it can be concluded that, the unrest of various shades, working against the internal security of Nigeria as a result of faulty educational curriculum which galvanized unemployment will be put to rest if urgent actions are taken to address the situation. The following suggestions are hereby by made:

1. There is need to review the curriculum of Nigerian education at all levels in line with the prevailing situations. Education system should be reviewed in such a way that it will make beneficiaries job creators rather than job seekers. In other words, there is need for proper synergy between education, vocational studies and entrepreneurship skills.

2. The government should embark on mass employment of the youths.

3. The government should review policy on retirement age so as to create vacancies for the unemployed youth. This can be done without creating another problem provided government put up a workable pension scheme in which retirees are paid their gratuities and pension promptly. If the pension scheme is good, people won't be requesting for an upward review of retirement age, thereby, closing the door of employment opportunities for younger generations.

4. There is the need to diversify the economy. In other words, government should focus on agriculture and also give soft loan to unemployed youth, assist with the necessary farm

input, monitor the use and ask them to pay half of the loan instalmentally after establishing them.

5. There is also the need to strengthen university-industry collaboration. This can be done by bringing in experts from the industrial sector to make input in the curricular in such a way that will reflect the needs of the industry. Such experts should also be involved in teaching on part time bases at higher levels of education.

6. School-industry linkage should be strengthened as a way of giving meaning and effect to the current drive on Technical and Vocational Education and Training (TVET)

7. There is the need to devise strategies for effectively controlling of all forms of examination malpractice in both internal and external examination to ensure quality graduates.

8. There is need for a review of our education curriculum to include critical subjects that are necessary for development of informed and well rounded citizens. There is no doubt that a good knowledge of certain subjects such as our national history and civics will help in the development of more socially aware youths, truly literate and educated citizens who understand and appreciate the nation's peculiar challenges and can situate themselves within the search for solutions to the problems. Through the curriculum used in our schools, we need to develop citizens that are truly Nigerians at heart and care about the challenges facing our country.

9. Regular revision and introduction of innovative curricula such as in Family living Education, Entrepreneurship Education will go a long way to assuaging some of the existing gaps in pupil acquisition of the right attitude to life and work.

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CURRICULUM DEVELOPMENT AND INNOVATION IN TECHNOLOGY EDUCATION IN NIGERIA

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Abstract

Science, Technology, Education Development and Innovations are the essential key to improvement and are being brought forward at an increasingly rapid rate, thereby forcing Technology Educators to adapt to new realities also they play a fundamental role in the creation of Wealth, Economic Development and in the enhancement of the quality of life for all citizens. Furthermore, in the rapidly changing and Development in Technology and Manufacturing Industry has affected the National Economies and Education System of countries and must be continually re-evaluated and revised. To make this process more manageable and to create programmes that more accurately reflect the demands of the marketplace, a curriculum revision process is presented. New challenges and new demands are making necessary to re-design curricula of Technology Education Programmes with Industry partnership and business sectors for global economy. The development of curricula should stress the need for flexibility in structure and modes of delivery of Technology Education Programmes. The curriculum and syllabi in Technology Education is dynamic as it shifts with societal requirements as well as student inputs. The paper submits recommendation on further enhanced strategies that will help in the development of education in line with modern trends in curriculum issues. The purpose of this paper is to present an analytical review of the curriculum and innovation in technology educational field in Nigeria. It outlines classification of innovations, discusses the hurdles to innovation, and offers ways to increase the scale and rate of innovation-based transformations in the education system. It concludes that for any meaningful advancement to be made in the education sector there must be conscious, deliberate, purposeful, directional policy formulation of the implementation of the curriculum.

Introduction

Education, being a social institution serving the needs of society, is indispensable for society to survive and thrive. It should be not only comprehensive, sustainable, and superb, but must continuously evolve to meet the challenges of the fast-changing and unpredictable globalized world. This evolution must be systemic, consistent, and scalable; therefore, school teachers, college professors, administrators, researchers, and policy makers are expected to innovate the theory and practice of teaching and learning, as well as all other aspects of this complex organization to ensure quality preparation of all students to life and work.

Here we present a systemic discussion of educational innovations, identify the barriers to innovation, and outline potential directions for effective innovations. We discuss the current status of innovations in Nigeria education, what educational innovation is, how innovations are being integrated in schools and colleges, why innovations do not always produce the desired effect, and what should be done to increase the scale and rate of innovation-based transformations in our education system. We then offer recommendations for the growth of educational innovations. As examples of innovations in education, we will highlight online learning and time efficiency of learning using accelerated and intensive approaches.

Technology Education is the activity of teaching Technology and Technical, at School, College and University levels. The goal of Technology Education is to prepare people to practice technology as a Profession and also to spread Technological Literacy, increase student interest in Technical Careers through Science and Mathematics education and hands-on learning.

Technology is a global industry undergoing a period of unprecedented change. The future of technology is being framed by global forces which transcend national boundaries such as the impacts of globalisation, rapid technology advances, climate change and inequality. Through the application of science, technology and humanity has the potential to meet all of its basic needs: water, sanitation, food security, shelter, energy and transport.

Technological and scientific advances especially at the interface of advanced computing, biology and physics are leading exponential growth of innovation and opening a world of new possibilities and markets. It follows that technology at higher education needs to constantly strive to keep pace with these advances and in particular the contribution of technology to these global opportunities and challenges.

Concept of curriculum development

Curriculum can be defined as the structural basis for the organization and implementation of education and training, as well as for achieving the intended leaning outcomes, (Engelshoven, 2009)

Curriculum Development therefore, is the systematic process of designing and preparing all the courses offered in a particular subject. It is one of pedagogical exercises that are necessary for development of education. Its development requires a broader view that considers the needs and the impacts of students, teachers, institutions, employers and governments and includes the factors like content, teaching and evaluation strategies, teaching resources and facilities. Refers that, curricula may be organised at two levels.

The first approach may be at a macro level, in which the decisions are made about the type of courses to be offered, the amount of time to be devoted to each, the way they will be arranged over the program and so forth.

Secondly, the particular content elements and learning activities can be selected and organised to optimise the knowledge gained by the student. The two types of organisation may be compared to the adjustment as in tuning a mechanism or an instrument; first gross adjustments are made, and then fine tuning is carried out based on group requirements. The design of the entire curriculum process is intended to illustrate the syllabus as being the outcome of a complex design activity. This involves the declaration of objectives and simultaneous design of assessment and instruction procedures that will cause those objectives to be obtained for a particular programme and institute. Providers of technology and technical education should design their curriculum in line with the needs of industry and individual students, and should update the curriculum regularly to accommodate advances in technology, learning and teaching methods, social and cultural development, job market needs and globalisation. Technology and technical education providers should also design and run short courses for Continued Professional Development (CPD) and life-long learning. Innovations in Nigeria education.

Innovations in Nigeria Education

For an individual, a nation, and humankind to survive and progress, innovation and evolution are essential. Innovations in education are of particular importance because education plays a crucial role in creating a sustainable future. "Innovation resembles mutation, the biological process that keeps species evolving so they can better compete for survival" (Hoffman & Holzhuter, 2012). Innovation, therefore, is to be regarded as an instrument of necessary and positive change. Any human activity (e.g. industrial, business, or educational) needs constant innovation to remain sustainable.

The need for educational innovations has become acute. "It is widely believed that countries' social and economic well-being will depend to an ever greater extent on the quality of their citizens' education: the emergence of the so-called 'knowledge society', the transformation of information and the media, and increasing specialization on the part of organizations all call for high skill profiles and levels of knowledge. Today's education systems are required to be both effective and efficient, or in other words, to reach the goals set for them while making the best use of available resources" (Cornali, 2012). According to an Organization for Economic Cooperation and Development (OECD) report, "the pressure to increase equity and improve educational outcomes for students is growing around the world" Many in the Nigeria seem to recognize that education at all levels critically needs renewal: "Higher education has to change. It needs more innovation". "It has become platitudinous to speak of the winds of change in education, to remind those interested in the educational enterprise that a revolution is in progress". "Education not only needs new ideas and inventions that shatter the performance expectations of today's status quo; to make a meaningful impact, these new solutions must also "scale," that is grow large enough, to serve millions of students and teachers or large portions of specific underserved populations" Lack of innovation can have profound economic and social repercussions.

What is interesting here is that while we are still undecided as to what to do with our struggling schools and universities and how to integrate into them our advanced inventions, other nations are already benefiting from our innovations and have in a short time successfully built world-class education systems. It is ironic that an admirable Finnish success was derived heavily from Nigeria educational research. It looks like the issue of educational innovation goes beyond the field itself and requires a strong societal response.

Three big questions arise from this discussion: why, having so many innovators and organizations concerned with innovations, does our education system not benefit from them? What interferes with creating and, especially, implementing transformative, life-changing, and much-needed innovations across schools and colleges in this country? How can we grow, support, and disseminate worthy innovations effectively so that our students succeed in both school and university and achieve the best learning outcomes that will adequately prepare them for life and work? Let us first take a look at what is an educational innovation.

Concept of Educational Innovation

Creativity is thinking up new things. Innovation is doing new things. To innovate is to look beyond what we are currently doing and develop a novel idea that helps us to do our job in a new way. The purpose of any invention, therefore, is to create something different from what we have been doing, be it in quality or quantity or both. To produce a considerable, transformative effect, the innovation must be put to work, which requires prompt diffusion and large-scale implementation.

Innovation is generally understood as "The successful introduction of a new thing or method" (Brewer & Tierney, 2012). In essence, "innovation seems to have two subcomponents.

First, there is the idea or item which is novel to a particular individual or group and, Second, there is the change which results from the adoption of the object or idea" (Evans, 1970). Thus, innovation requires three major steps:

1. an idea,
2. its implementation, and
3. the outcome that results from the execution of the idea and produces a change.

In education, innovation can appear as a new pedagogic theory, methodological approach, teaching technique, instructional tool, learning process or institutional structure that, when implemented, produces a significant change in teaching and learning, which leads to better student learning. So, innovations in education are intended to raise productivity and efficiency of learning and/or improve learning quality.

Reforming higher education without reforming secondary education is futile. Trying to change education while leaving disfunctional societal and cultural mechanisms intact is doomed. It is crucial, therefore, when innovating to ask, "What is this innovation for?" "How will it work?" and "What effect will it produce?"

Many of us educators naively believe grand reforms or powerful technologies will transform our education system. Did we not hope that new information technologies would make education more effective and relieve teachers from tedious labour? However, again and again we realize that neither loud reforms nor wondrous technology will do the hard work demanded of teachers and learners. Innovations can be categorized as evolutionary or revolutionary (**Osolind, 2012**), sustaining or disruptive (**Christensen & Overdorf, 2000**; **Yu & Hang, 2010**) Evolutionary innovations lead to incremental improvement but require continuity; revolutionary innovations bring about a complete change, totally overhauling and/or replacing the old with the new, often in a short time period. Sustaining innovation perpetuates the current dimensions of performance (e.g. continuous improvement of the curriculum), while disrupting innovation, such as a national reform, radically changes the whole field. Innovations can also be tangible (e.g. technology tools) and intangible (e.g. methods, strategies, and techniques). Evolutionary and revolutionary innovations seem to have the same connotation as sustaining and disruptive innovations, respectively.

All innovations are ultimately directed at changing qualitative and/or quantitative factors of learning outcomes:

Qualitative: Better knowledge, more effective skills, important competencies, character development, values, dispositions, effective job placement, and job performance; and

Quantitative: Improved learning parameters such as test results, volume of information learned, amount of skills or competencies developed, college enrolment numbers, measured student performance, retention, attrition, graduation rate, number of students in class, cost, and time efficiency. In education, we can estimate the effect of innovation via learning outcomes or exam results, teacher formative and summative, formal and informal assessments, and student self-assessment. Innovation can also be computed using such factors as productivity (more learning outcomes in a given time), time efficiency (shorter time on studying the same material), or cost efficiency (less expense per student) data. Other evaluations can include the school academic data, college admissions and employment rate of school graduates, their work productivity and career growth.

Assessing the effects of innovation can also be based on the scale of implementation:

Innovations usually originate either from the bottom of the society (individual inventors or small teams) – bottom-up or grass root approach, or from the top (business or government) – top-down or administrative approach. Sometimes, innovations coming from the top get stalled on their way to the bottom if they do not accomplish their goal and are not appreciated or supported by the public. Should they rise from the bottom, they may get stuck on the road to the top if they are misunderstood or found impractical or unpopular. They can also stop in the middle if there is no public, political, or administrative or financial backing. Thus, innovations that start at the bottom, however good they are, may suffer too many roadblocks to be able to spread and be adopted on a large scale. Consequently, it is up to politicians, administrators, and society to drive or stifle the change. Education reforms have always been top-down and, as they near the bottom, typically become diverted, diluted, lose strength, or get rejected as ineffective or erroneous.

Innovations enriching education can be home-grown (come from within the system) or be imported (originate from outside education). Examples of imported innovations that result from revolution, trend, or new idea include the Information Technology Revolution, Social Media, Medical Developments (MRI), and Cognitive Psychology. Innovations can also be borrowed from superior international theories and practices (see Globalization of Education chapter). National reform may also be a route to innovation, for instance when a government decides to completely revamp the system via a national reform, or when an entire society embarks on a new road, as has happened recently in Singapore, South Korea, and Finland.

Innovation in any area or aspect can make a change in education in a variety of ways. Ultimately, however, innovations are about quality and productivity of learning (this does not mean we can forget about moral development, which prepares young people for life, work, and citizenship) (**Camins, 2015**). Every innovation must be tested for its potential efficiency. The roots of learning efficiency lie, however, not only in innovative technologies or teaching alone but even more in uncovering potential capacities for learning in our students, their intellectual, emotional, and psychological spheres. Yet, while innovations in economics, business, technology, and engineering are always connected to the output of the process, innovation in education does not necessarily lead to improving the output (i.e. students' readiness for future life and employment). Test results, degrees, and diplomas do not signify that a student is fully prepared for his or her career. Educational research is often disconnected from learning productivity and efficiency, school effectiveness, and quality output. Innovations in educational theories, textbooks, instructional tools, and teaching techniques do not always produce a desired change in the quality of teaching and learning. What, then, is the problem with our innovations? Why do not we get more concerned with learning productivity and efficiency? As an example, let us look at technology applications in teaching and learning.

Effects of Technology Innovations in Education

A tool is just an opportunity with a handle. When analyzing innovations of our time, we cannot fail to see that an overwhelming majority of them are tangible, being either technology tools (laptops, iPads, and smart phones) or technology-based learning systems and materials, e.g., learning management system (LMS), educational software, and web-based resources. Technology has always served as both a driving force and instrument of innovation in any area of human activity. It is then natural for us to expect that innovations based on ET applications can improve teaching and learning. Though technology is a great asset, nonetheless, is it the single or main source of today's innovations, and is it wise to rely solely on technology?

The rich history of ET innovations is filled with optimism. Just remember when tape recorders, video recorders, TV, educational films, linguaphone classes, overhead projectors, and multimedia first appeared in school. They brought so much excitement and hope into our classrooms! New presentation formats catered to various learning styles. Visuals brought reality and liveliness into the classrooms. Information and computer technology (ICT) offered more ways to retrieve information and develop skills. With captivating communication tools (iPhones, iPads, Skype, FaceTime), we can communicate with anybody around the world in real time, visually, and on the go. Today we are excited about online learning, mobile learning, social networking learning, MOOCs, virtual reality, virtual and remote laboratories, 3D and 4D printing, and gamification. But can we say all this is helping to produce better learning? Are we actually using ET's potential to make a difference in education and increase learning output?

Technology is used in manufacturing, business, and research primarily to increase labor productivity. Because integrating technology into education is in many ways like integrating technology into any business, it makes sense to evaluate technological applications by changes in learning productivity and quality. William Massy and Robert Zemsky wrote in their paper, "Using Information Technology to Enhance Academic Productivity," that "Technology should be used to boost academic productivity" **Massy and Zemsky, (1995**). National Educational Technology Standards also addressed this issue by introducing a special rubric: "Apply technology to increase productivity" (**National Educational Technology Standards, 2004**). Why then has technology not contributed much to the productivity of learning? It may be due to a so-called "productivity paradox" **Brynjolfsson, (1993**), which refers to the apparent contradiction between the remarkable advances in computer power and the relatively slow growth of productivity at the level of the whole economy, individual firms, and many specific applications. Evidently, this paradox relates to technology applications in education.

A conflict between public expectations of ET effectiveness and actual applications in teaching and learning can be rooted in educators' attitudes toward technology. What some educational researchers write about technology in education helps to reveal the inherent issue. The pillars and building blocks of twenty-first century learning, according to Linda**Baer and James McCormick (2012**, p. 168), are tools, programs, services, and policies such as web-enabled information storage and retrieval systems, digital resources, games, and simulations, eAdvising and eTutoring, online revenue sharing, which are all exclusively technological innovations. They are intended to integrate customized learning experiences, assessment-based learning outcomes, wikis, blogs, social networking, and mobile learning. The foundation of all this work, as these authors write, is built on the resources, infrastructure, quality standards, best practices, and innovation.

These are all useful, tangible things, but where are the intangible innovations, such as theoretical foundation, particularly pedagogy, psychology, and instructional methodology that are a true underpinning of teaching and learning? The emphasis on tools seems to be an effect of materialistic culture, which covets tangible, material assets or results. Similarly, today's students worry more about grades, certificates, degrees, and diplomas (tangible assets) than about gaining knowledge, an intangible asset **Business Dictionary, (2016**). We may come to recognize that modern learning is driven more by technological tools than by sound theory, which is misleading.

According to the UNESCO Innovative Teaching and Learning (ITL) Research project conducted in several countries, "ICT has great potential for supporting innovative pedagogies, but it is not a magic ingredient." The findings suggest that "When considering ICT it is important to focus not on flash but on the student learning and 21st century skills that ICT can enable" **UNESCO, (2013**). As **Zhao and Frank (2003)** argue in their ecological model of technology integration in school, we should be interested in not only how much computers are used but also how computers are used. Evidently, before starting to use technology we have to ask first, "What technology tools will help our students to learn math, sciences, literature and languages better, and how to use them efficiently to improve the learning outcomes?"

Thus, the problem of ET innovations is twofold: any integration of technology in teaching and learning has to demonstrate an increased productivity of teaching and learning, but it can be achieved only when ET applications are based on an effective pedagogic theory. Technology innovation will eventually drive pedagogic innovations, without a doubt, however, this path is slower, more complicated, and leads to an enormous waste of financial, technical and human resources.

Technocentric syndrome

More disquieting than even the lack of pedagogical foundation for technology-enhanced education is the sincere belief of many educators that technology will fix all the problems they encounter in the classroom, be they live or virtual. Consequently, fewer university professors nowadays perceive the need for pedagogic mastery in online teaching in addition to content-area expertise as they reason technology will solve all instructional difficulties anyway. This belief is called "techno centrism" **Pappert, (1990**), which, according to **Nickols (2011)**, is common in higher education and e-learning discussions. It is probably common in secondary school as well. Unfortunately, educators often forget that the computer is only an extension of human abilities, not a replacement or substitute. We, as educators, must realize that for technology innovation to produce a positive effect in learning it must be preceded by pedagogic leadership, research, and sound theory; however, the reality is typically the reverse. We are excited to grab the new gadget and try to fit it into the classroom without preliminary assessment of its implementation challenges and potential effects, solid research, or laying out a theoretical foundation based on advanced pedagogic theory which will ensure its effective use.

Technology (as an entity) contains an inherent pedagogical value (**Accuosti, 2014**, p. 5). It pushes the limits of what educators can do but is not a magic wand; it is only a means, an instrument, a tool for an innovative teacher and learner. That we overestimate technology's power in education has its roots in human anticipation of a miracle, or a hope of finding a quick fix. But "We can't just buy iPads (or any device), add water, and hope that strategy will usher schools to the leading edge of 21st century education. Technology, by itself, isn't curative. Human agency shapes the path" (**Levasseur, 2012**). We are all excited by the technology and information revolution and believe in its potential but "Perhaps the next important revolution isn't technological, even as technology marches forward unabated. Perhaps the revolution that we need, the one we should aspire to, is societal. Indeed, the next revolution should be one of education, empathy, and a broader understanding of the world, and of its people and culture" (**Jiang, 2015**).

One of my students wrote in a recent online class, "Students learn from their teachers, not from electronic gadgets." Do we understand how students learn in a technology-based environment, one-on-one with the laptop or mobile phone? Can we estimate possible changes in the students' cognition, learning style, behavior, attitudes, values, and social relationships under the influence of electronic devices? It is certainly true that live interaction between students and their teachers' offers worthy examples and enlightening experiences for students and gratifying moments for teachers. Overestimating the power of technology, regrettably, leads to the deterioration of the "human element" **Serdiukov, (2001**) in technology-based and, particularly, online teaching and learning. It further underestimates the need for sound pedagogy and quality teacher preparation. It may also have a devastating impact on our ability to socialize, collaborate, and survive. George Friedman argues that computers have had "profoundly disruptive consequences on cultural live throughout the world" **Friedman, 2012** , p. 25, which could not have left education unperturbed.

Neil Postman addressed another concern of overemphasizing the role of technology in education, cautioning against "Surrendering education to technology" **Postman, (1993**), which may have far-reaching social and cultural consequences (**Serdyukov, 2015b**. According to **Sousa (2014)**, the widespread use of technology is having both positive and negative effects on students' attention and memory systems. A strong warning about the negative effects of the Web comes from **Maurer *et al.* (2013)**, who caution that modern media, particularly networked computers, are endangering our capacity to think, to remember clearly, and to read and write with concentration; they also imperil creativity. "New technologies, whether or not they succeed in solving the problem that they were designed to solve, regularly create unanticipated new problems" **Diamond, (2005**, p. 505. There are numerous social, cultural and psychological side effects of technology-enhanced or technology-based education, among them placing unrealistic hopes on technology, which leads to weakening a student's and teacher's effort and eventually takes the teachers out of the equation. This in turn makes the outcomes of online learning overly dependent on the LMS platform, washing away human interaction and communication by industrializing and formalizing learning.

Christensen and Eyring (2011), who wrote about disruptive innovations that force universities to change, predict that teaching in the future will be disruptable as technology improves and shifts the competitive focus from a teacher's credentials or an institution's prestige to what students actually learn. Their observations support the findings of other studies that indicate learning occurs best when it involves a blend of online and face-to-face learning, with the latter providing essential intangibles best obtained on a traditional college campus. From this statement, one can extrapolate that technology alone cannot ensure productive and enriched learning and, especially, personal and social development as students still need a human element in a technology-enhanced environment. Additionally, when planning to apply a new technology to education, we have to consider its potential pedagogic and psychological effects. Finally, we need a solid, innovative, theoretical foundation for online learning. This foundation would help teachers do a better job in both classroom and online environments than simply integrating computers and other gadgets into learning. It would help enrich students' otherwise almost entirely independent online experiences using only LMS navigation as a GPS in the world of knowledge with inspiring interaction with a live instructor, peers, and real life.

As technology-based education is unquestionably going to grow, we need to make it pedagogically, psychologically, and socially meaningful and effective. At the same time, we want to minimize its negative short- and long-term consequences, which reaffirm the need for a comprehensive theory of technology-based education and serious research.

Online learning concerns

Demand for online learning is largely driven by working adult students (WALs) willing to have broad access to education and, at the same time, to accommodate learning to their busy lives, rather than by its effectiveness as a cognitive tool, which is determined by its most attractive feature – convenience (**Christensen & Eyring, 2011)** . In studies of student satisfaction, students commonly rate their online experiences as satisfactory, with convenience being the most cited reason. We observe students' preference for convenience as a consumer strategy, and regrettably, not only in online higher education but across the whole educational system (**Kerby *et al.*, 2014**). Convenience, along with comfort, helps reduce workload and complexity of learning, as well as the strain of face-to-face interaction with the class and instructor. It produces a sense of privacy and self-satisfaction. It also generates a false perception that online learning is easier than learning in the classroom **Aaron, (2007**; **Westra, (2016**), and often leads to online cheating **Spalding, (2012**). The convenience, like the happiness factor, however, means a less demanding and less rigorous school experience (**Zhao, 2012**, p. 137). Convenience can be a blessing for creative people, liberating them from the need to waste time and energy on trifles; however, it may also develop self-gratification and laziness instead of struggling with obstacles and doing the hard job of digging in the knowledge mine.

So, accessibility and, especially, convenience, enhanced by flexibility of the study schedule and comfortable learning environment of one's office or bedroom are evidently the key factors of its popularity among students. The motto of online education, "Any time, any place, any pace" is extremely seductive. Yet, despite a number of studies showing that online learning is on a par with traditional, campus-based learning (**Ni, 2013**; **Wrenn, 2016**), it is going to take more time and effort to really make online learning deliver outcomes comparable to the traditional classroom-based, face-to-face education. Mattan Griffel, Founder of "One Month," an online education start up, rethinks online education in the aftermath of the MOOC explosion writing, "[Online education] has kind of overstepped its current effectiveness, and everyone is saying what is possible by painting this picture, but the tools haven't reached that point yet" **Crichton, (2015**). We know very well online education suffers from restricted interaction among students and with the instructor, is deficient of live collaboration, and lacks opportunities for relationships that take form in a study group. These collective relationships are crucial for individual success. Productive online learning also depends on well-developed learning, technology, critical thinking, research, and even reading and writing skills, as well as strong intrinsic motivation, perseverance, and self-efficacy, which many students do not possess.

Finally, substituting real-life objects and processes with virtual reality is not helpful in developing practical skills, which makes real-world laboratory and experimental work less effective in virtual online environments.

Still, the question remains whether online education has helped improve teaching and learning. With the popularity of online education and enormous investment, do online college programs now prepare better specialists? Have we achieved the result we had expected, besides widening access to education for working adult learners, formerly marginalized groups, such as disabled students and minorities, and people geographically separated from the learning centres, thus reaching multi-million enrolment in online programs by 2016 and making sure that students enjoy convenience in their studies?

Innovative technology may bring performance enhancement in some ways but does not necessarily produce a direct benefit to education expressed by increased learning productivity. Are the secondary benefits, like convenience or fun with technology, worthy of heavy investment? What, then, is needed to raise the quality of education? The real question here is, as always, do we control technology, or do we let ourselves be controlled by it and those who have created it? "Choose the former," writes an innovative author Douglas Rushkoff, "and you

gain access to the control panel of civilization. Choose the latter, and it could be the last real choice you get to make" (**Rushkoff, 2010**). The raw powers of technology should be harnessed by sound pedagogy.
Pedagogy of online education is just being developed, after two decades of titanic effort (**Serdyukov, 2015a**). Online learning is a big business which should be turned into a serious academic endeavour. When improving online learning, we should not narrow our innovative focus down to only technical solutions in all educational issues. We need to develop a broader look at all aspects of teaching and learning rather than trying to resolve problems and overcome barriers with technology alone.

Barriers to Innovation in Technology Education
There are reasons for the discrepancy between the drive for educational innovation that we observe in some areas, great educational innovations of recent times, and the daily reality of the education system.

Firstly, if we look at the education holistically, as a complete system in charge of sustaining the nation's need for educating society members and building their knowledge and expertise throughout their active lifetime, we have to acknowledge that all educational levels are interrelated and interdependent. Moreover, education being a system itself is a component of a larger social super system, to which it links in many intricate and complicated ways. As a social institution, education reflects all the values, laws, principles, and traditions of the society to which it belongs. Therefore, we need to regard education as a vital, complete, social entity and address its problems, taking into account these relations and dependencies both within the educational system and society.

In turn, if the society supports innovations in education, then its educational system will continuously and effectively evolve and progress. If it does not, education will stagnate and produce mediocre outcomes **Feeman & Thomas, 2005**; **Ng & Forbes, 2009**).

Secondly**,** it is well known that higher education has been historically slow to adopt innovations for various reasons. Because it is complex (due to cohesion and continuity of science) and labour intensive, higher education is particularly difficult to make more productive. Secondary school is even more conservative than universities because they cater more and more to students' well-being and safety than to their preparation for real life and work. Both secondary and higher education function as two separate and rather closed systems in their own rights. They are not only loosely connected to the wider world but also suffer from a wide disconnect between high school output measured in graduate learning outcomes and college entrance student expectations. It seems that "[…] the systems and values of industrial education were not designed with innovation and digital tools in mind. Innovation, whether it is with technology, assessment or instruction, requires time and space for experimentation and a high tolerance for uncertainty. **Hoffman and Holzhuter, (2012**); **Marcus, (2012**); **Evans, (1970**).

Innovation is difficult to spread across school and academia because it disrupts the established routine and pushes implementers out of their comfort zone. Terry Heick writes that "Many schools give lip-service to the concept of innovation in mission statements, on websites, in PDs (professional development), and during committee, council, and board meetings, but lose their nerve when it's time to make it happen. Supporting something seen as secondary (innovation) in the face of pressure, far-reaching programs, external standards ranging from Common Core to Literacy, Technology, and Career Readiness becomes a matter of priority and job security.

While education begs for innovation, arguments against it often turn to tempting, straw man attacks" **Heick, (2016**). In many instances, innovation in educational institutions does not take priority over pressing routine issues – really, abiding by the state standards is more urgent.

Teachers and school administrators are commonly cautious about a threatening change and have little tolerance for the uncertainty that any major innovation causes. Of course there are schools and even districts that are unafraid to innovate and experiment but their success depends on individual leaders and communities of educators who are able to create an innovative professional culture. Pockets of innovation give hope but we need a total, massive support for innovations across society.

Thirdly**,** One of the reasons for the slow pace of improvements in education is a sharp conflict between society's welfare and political and business interests.

Fourthly**,** Even when an innovation comes to life, it is of little worth without implementation (Csikszentmihalyi, 2013). Innovation is not about talking the talk but walking the walk. Moreover, an innovation can make a significant difference only when it is used on a wide scale. To create innovations is not enough, they need to be spread and used across schools and universities, a more difficult task. For the innovation to make a sizable effect, we need an army of implementers together with favourable conditions for the invention to spread and produce a result. Implementers in turn have to be creative and motivated to do their job; they must also have freedom to innovate in the implementation, security on the job to take risks, and control of what they are doing. Ultimately, they need be trusted to do their job right. In short, there must be an "innovation-receiving system" (**Evans, 1970**).

Lastly, Innovations grow in a favourable environment, which is cultivated by an educational system that promotes innovation at all levels and produces creative, critical thinking, self-sufficient, life-long learners, problem solvers, and workers. This system enjoys a stimulating research climate, encourages uplifting cultural attitudes towards education, and rallies massive societal support.

Possible solutions

To create innovations, we need innovators, and many of them. But though innovation is often a spark originated in the mind of a bright person, it needs an environment that can nourish the fire. This environment is formed and fed by educational institutions, societal culture, and advanced economy. Csikszentmihalyi underlines the importance of creating a stimulating macroenvironment, which integrates the social, cultural, and institutional context, and also microenvironment, the immediate setting in which a person works. "Successful environment provide(s) freedom of action and stimulation of ideas, coupled with a respectful and nurturant attitude toward potential geniuses".

Then, when the invention is created, it must fall into a fertile ground like a seed and be cultivated to grow and bring fruit. Csikszentmihalyi writes, "Creative ideas vanish unless there is a receptive audience to record and implement them. Edison's or Einstein's discoveries would be inconceivable without the prior knowledge, without the intellectual and social network that stimulated their thinking and without the social mechanisms that recognized and spread their innovations (2013, p. 6)". The audience is not only the educators but also students, parents, policy makers, and all other members of society who act either as implementers or consumers of the innovation.

Technology integration in education can be successful only when the human element is taken into consideration. This then integrates innovators, implementers, educational leadership, professional community and, certainly, the learners. Walter Polka and Joseph Kardash argue that the effectiveness of a computer innovation project they developed "Was facilitated by the school district leadership because of their focus on the 'human side' of change" (**Polka & Kardash, 2013**, p. 324). They found correlation between the implementation process employed in the district and the concepts associated with the three general need categories of innovation implementers: organizational needs, professional needs, and personal needs, which contributed to the innovation's success. Long-lasting changes require "a mixture of cultural and institutional changes, commitment from those within the program, and active and engaged leadership,"

When we try to innovate education, we often leave students out of the equation. We do not innovate in students' learning, their mind, attitudes, behaviours, character, metacognition, and work ethics enough. Research of exemplary educational systems across the world vividly demonstrates that teacher quality is the fundamental element of educational success: "It is especially teachers who shape students' learning environments and help them reach their intellectual potential" (**Vieluf *et al.*, 2012**, p. 113). Teacher education and professional development are definitely one of the primary areas that call for innovative approaches: teachers must be taught to teach well (**Marcus, 2012**). The "how" of the teaching (instructional methodology) is as important as the "what" (content) (**Morais *et al.*, 2004**). Teacher social status is one of the determining factors of the teacher quality.

Teachers' status in the most advanced countries like Finland, Singapore, South Korea, and Japan is very high. It reflects the quality of teaching and learning and also the level of pedagogic innovations. In our drive to enhance educational innovation, empowering school teachers and college instructors may be the most important task. Eventually, the most recognized pathway to education innovation, writes Shelton, is "basic and applied research, with more and better leveraged resources, more focus, and more discipline, this pathway can accelerate our understanding of teaching and learning and production of performance enhancing practices and tools" **Shelton, (2011**). Research focusing on raising productivity and efficiency and improving the quality of learning has to increase in all critical areas of education. One crucial indicator of educational effectiveness is measuring the quality of learning that remains imperfect.

Societal support for innovative education and building up a new culture of educational pre-eminence both inside the education system and around it is paramount for its success. **Brunner (1996)** suggests viewing education in a broader context of what society intends to accomplish through its educational investment in the young. The best way to achieve superior education is to shape a new educational culture.

Conclusion

Nigeria education desperately needs effective innovations of scale that can help produce high quality learning outcomes across the system and for all students. We can start by intensifying our integration of successful international learning models and creating conditions in our schools and colleges that foster and support innovators and educational entrepreneurs, or edupreneurs (**Tait & Faulkner, 2016**). Moreover, these transformations should be varied, yet systematic, targeting different vital aspects of education. Deep, multifaceted, and comprehensive innovations, both tangible and intangible, have the capacity to quickly generate scalable effects.

Radically improving the efficiency and quality of teaching and learning theory and practice, as well as the roles of the learner, teacher, parents, community, society, and society's culture should be the primary focus of these changes.

As the price of education, especially at colleges and universities, continues to rise, cost and time efficiency of learning, effective instructional approaches, and methods and tools capable of fulfilling the primary mission of education all will become critical areas of research and inventive solutions.

Whatever technologies we devise for education, however much technology we integrate into learning, the human element, particularly the learner and teacher, remains problematic. Computers for schools are ready, but are we ready? Our understanding of how students learn and how teachers teach and craft their methodology in technology-based environments remains lacking.

Therefore, the key to a prosperous, inventive society is a multidimensional approach to revitalizing the educational system (structures, tools, and stake holders) so that it breeds learners' autonomy, self-efficacy, critical thinking, creativity, and advances a common culture that supports innovative education. In order to succeed, innovative education must become a collective matter for all society for which we must generate universal public responsibility. Otherwise, all our efforts to build an effective educational system will fail.

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STEM: A PANACEA FOR CURRICULUM ISSUES IN SCIENCE AND TECHNOLOGY

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Abstract
This paper discusess the importance of incorporating STEM into the curriculum of Science and Technology. STEM is an acronym for science, technology, engineering, and mathematics, which is important because it involves every part of human lives. It also reviewed the current rate of student involvement in STEM programme. Science is everywhere in the world around, Technology is continuously expanding into every aspect of our lives, Engineering enables designs of roads and bridges, but also tackles the challenges of changing global weather and environmentally-friendly changes to our home. Mathematics is in every occupation, every activity we do in our lives. By exposing students to STEM and giving them opportunities to explore STEM-related concepts, they will develop a passion for it and thereby pursue a job in a STEM field. A curriculum that is STEM-based has real-life situations to help the student learn. This paper highlights the prospect of STEM incorporation in the curriculum of Science and Technology.

Introduction

Despite concerted efforts by African governments to develop and improve upon their scientific and technological human-power and self-reliance, particularly through curriculum development, it is doubtful whether these goals have been satisfactorily achieved especially with the current crisis on self-reliance drive across most developing countries. Among the recent efforts is the emergence and metamorphosis of SEM or SMET (Science, Technology & Mathematics) to STEM. STEM is an acronym meant for teaching and learning in the fields of science, technology, engineering and mathematics. These teaching commonly include all education related activities across all grade levels starting from pre-school up to post-doctoral levels. These could also be either informal, formal setting or both. As a basis for the different emerging technologies, the role of STEM is crucial to the development of any economy.

STEM has popularly been adjudged as indispensable ingredient to sustainable development (Gonzalez & Kuenzi, 2012). It is expected to serve as basic supply of manpower to industrial communities towards the achievement of virile economic and national development. Specifically, by designs and possibility of self-reliant, STEM is hope to engender socioeconomic development through opportunity for employment, income benefit, and welfare improvement (Aguele et al, 2007). It is meant to foster scientific skills and capability and habit to solve problems coupled with imaginative creative thinking, and general mental prowess. However, it is obvious that, as at today, these lofty goals (of STEM) cannot be said to have been satisfactory achieved in most developing countries, especially Nigeria, consider the level of development and massive unemployment of graduates, the supposedly 'STEMmed' technocrats. Human capital represents a major instrument for advancing technology (Smaghi, 2010).

Truthfully, as there are emerging massive assertions that STEM education system and STEM acquired skills are propellers of technological advancement (Fioriello, 2010), there are also perceived notions that the curriculum is wanting in creativity (Gonzalez and Kuenzi, 2012), including the personal ideas of the lead author and group opinions of the authors, particularly as it relates to developing countries. This missing creativity (and perhaps other components that are related) that are crucial parameters to foster competitive skills and innovative workforce could be found in the 'Arts' subjects or curricula (Dunning, 2012). As illustrated by Gonzalez and Kuenzi (2012), while technology or science is a fundamental, the cultural creativity that would sell those technologies are equally indispensable. Similarly, culture has also been identified to have impact on academic performance of students.

The creative industries, the graphic artists, TV campaign, the demographic profiles of citizens who are operators and mostly the end-users should always be available for plausible appreciable productivity among the contemporary industries. Basically, technological development can only be successfully built or studied with models that have human beings as the drivers rather than other units at the core of their analysis. Demography, which is the mathematics of people should be apposite discipline to the study of both human and technological development across the world. It also remain a potent medium through which the efforts and results of other educational fields, and economic sectors can be evaluated. The science of demography contains understanding of its (population) dynamics and process of birth, migration, and mortality, including aging, how people form societies, form nations, develop culture, and how they populate the earth (Amoo, 2012). Upon the backdrop that the present STEM seems to be inadequately preparing students or graduates for self-reliance world of work, there were recommendations for the introduction of entrepreneurship (Adebisi, 2012).
The perennial challenge of unemployment in Nigeria could be better reduced or eliminated through education. Education is considered as the process that people undergo or acquire knowledge/skills or abilities, and attitudinal behaviour that are required for successful living in the society. The achievement of this would produce individuals that are enterprising, either as employees, employers or entrepreneurs (Ezeudu, et al., 2013). This presentation is to re-echo the importance of STEM but emphasize the indispensable connection between STEM and demography, demographic analysis including other social sciences and studies in the humanities.

Current STEM Trends in Nigeria Education

The current state of STEM Education in Nigeria should be a matter of priority and concern to all science teachers and stakeholders. A look at our school system today shows that something is wrong in many ways. Enrolment into the different disciplines of science in our tertiary institutions is highly disproportionate (Akpan & Umoh, 2012). This may be due to the student dwindling performance in the Senior Secondary Certificate Examination (SSCE). A close look at the educational practices in Nigeria today reveals that the average science teacher sees the learner as a vessel in which to pour knowledge, thus relegating the potentials for self-directed learning to the background. In this approach, the emphasis is on impartation and regurgitation of facts. This makes students mere on-lookers, learning about science and not learning science. (Umoh, Akpan & Udongwo, 2013). Classroom activities are still characterized by the memorization of factual knowledge with the teacher as an informer and controller of the learning process (Akpan, Umoh, 2013). Learners are not provided the opportunity to express their understanding of concepts and relate knowledge claims to evidence in a systematic way. This type of learning according to Ajewale (1997) is one of the major factors opposing effective science teaching and learning in Nigeria.

Need for STEM

Science, Technology, Engineering, and Mathematics (STEM) are the field that helps students understand technological concept. There is focus in today's world in general on STEM, and it has become so universally discussed because of its enormous importance to students. STEM has become so valuable and should be in the forefront of the learning process for the following reasons.

i. The need for more people in STEM

Anja Zlatovic (2018) noted that more than a million job vacancies exist in the STEM industry currently, while at the same time only 16% of college students graduate in STEM fields or subjects. Demand for STEM jobs increased three times between 2000 and 2010, and continues to grow, with many new fields and professions emerging each day (Smith, 2019). With advances in artificial intelligence, millions of jobs are now vacant. So clearly, STEM is the key to the careers of the future and it needs many more participants.

In this competitive labor market, people who know math and science have better employment chances – for example, this knowledge and skill set are necessary to win IT positions in Silicon Valley (Anja Zlatovic, 2018). That is why we should not undervalue math or science and only focus on technology or engineering. We need to learn all STEM fields together and see them as equally important.

ii. Need to better prepare children for college – and for the STEM field in general

Research show horrifying statistics – 78% of secondary school graduates have been proven unprepared for higher institution courses, including courses in mathematics, science, reading, and English (Smith, 2019).

Better STEM education before higher institution level will encourage students to enroll in these courses there, and perhaps decide to pursue a career in related fields. Moreover, they'll be more confident about their studies in general and far less likely to drop out.

iii. STEM is vital for non-STEM jobs as well

We must remember that STEM education also reaches beyond the classroom and although it doesn't necessarily mean someone will end up in a STEM-related profession, scientific, technological, and mathematical knowledge is integral in today's world to many different careers, such as journalism and community outreach (Neal et al, 2011). Every job includes a financial aspect – math education can help in this. We live more and more in the digital age, so technology is important in all jobs. Even if you end up in humanities and the arts, computer skills are something you should be familiar with.

iv. STEM is vital to understanding the basics of the environment

Yet we don't only need STEM in our careers. So much of STEM-related knowledge can help us learn about our environment and society. In today's world, we can understand more phenomena if we understand STEM – from the weather to technology and electricity, even to politics (Neal et al, 2011). So a good STEM education is not just vital for tomorrow's Ph.D. candidates in biology or Nobel Prize winners. It is vital for everyone who wants to understand the world they live in.

Making everyone mathematically and technologically literate is the goal of technology and engineering education and is why it is being addressed not only at the state level but nationally as well. Teachers should never focus solely on those who have prospects to succeed in the STEM field and who are gifted. Their goal should be to make all children technologically and mathematically literate (Chesky et al, 2015).

v. Minorities are underrepresented

Not only do we have a lack of women in the STEM field, but numbers prove all minorities are underrepresented. There are just 2.2% of Latinos, 2.7% of African Americans, and 3.3% of Native Americans earning a college degree in STEM fields (Smith, 2019).

The fact that these minorities are not enrolling in STEM courses in college means they will have difficulty qualifying for STEM-related jobs. They will not be eligible for good positions and well-paying employment. If we continue to work on universal STEM education and provide a welcoming environment for all minorities, we will be enabling them to qualify for higher-ranking, well-paying jobs.

vi. STEM sparks general creativity

Studying STEM-related subjects can broaden the horizons of the mind. If you learn to think in a scientific way, you will learn the techniques of trial and error. The key is solving problems creatively, of questioning things, seeking the truth, and always be eager to explore more about how things work. Children should learn these things. That is why children should study science and its way of thinking.

In order to be a good scientist, you need to be creative and imaginative. And while the arts and imagination are often set aside as not that important for children, it is a great thing to know that by learning STEM, a child also practices these aspects of their thinking (Chesky, 2015). Good STEM education must not be boring, simplistic, and focused only on the pure facts of mathematics or science. It should be multidisciplinary, incorporating other skills and geared towards all children, so they can learn and enjoy.

Conclusion

In the 21st century, scientific and technological innovations have become increasingly important as we face the benefits and challenges of both globalization and a knowledge-based economy. To succeed in this new information-based and highly technological society, students need to develop their capabilities in STEM to levels much beyond what was considered acceptable in the past.

STEM education helps to bridge the ethnic and gender gaps sometimes found in math and science fields. Initiatives have been established to increase the roles of women and minorities in STEM-related fields. STEM education breaks the traditional gender roles. In order to compete in a global economy, STEM education and careers must be a national priority. It helps shelve the idea that technical schools are for the male gender. There is a need, therefore, to imbibe the science culture in every Nigerian so as to have the proper and requisite foundation on which to develop our science and technology which will in turn develop the country.

Recommendations

The following recommendations are made for effective STEM incorporation into the curriculum of science and technology.

1. The male and female gender should be involved in curriculum development so that both genders set can make inputs as it relates to individual genders with STEM in view.
2. Curriculum development should not be left to administrators alone but teachers who understand the current needs of the students they teach.
3. Regular training in form of workshops and seminars should be organized for Science Teachers so that they can meet up with new challenges

4. Science labs and workshops should be upgraded to modern standards while teaching facilities should be adequately provided

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STRATEGIES FOR IMPROVING EFFECTIVE DELIVERY OF TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING THROUGH CURRICULUM PLANNERS, IN NIGERIA

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Abstract
This paper examines the strategies for improving the effective delivery of Technical and Vocational Education (TVE) through the curriculum planners as a veritable working tool for academics, teachers and administrators at various educational levels to be utilized to steer and attain quality educational system for national sustainable development. Effective knowledge, development skills, utilization skills through participation of all stakeholders in education are very crucial in achieving quality curriculum development models for quality educational system in Nigeria. Curriculum development is dynamic process. It changes according to the need of the society and the stakeholders of the education system. The curriculum development process includes several stages such as planning, preparing, designing, developing, implementing, evaluating, revising, and improving. Curriculum planners are found at various levels, including national, state, institutional, expert in related fields, teacher-team and individual teacher levels, as well as in the classroom, where pupils or students and instructors cooperate. Curriculum planning aims at providing quality learning and teaching and developing students' knowledge and skills. Curriculum frameworks are developed to help planners in decision-making and in designing the curriculum. These frameworks include subject goals and purposes, content, guidelines for implementation and evaluation, teaching and learning principles. A well-planned curriculum is a result of clearly defined objectives which improve student learning outcomes. Intended learning results include a deep understanding of the matter and development of specific skills such as critical and creative thinking, problem solving, informed decision-making. Hence, for a society to achieve its educational goals, it needs a curriculum that is functional and relevant to its needs.

Keywords: Curriculum in TVE, Curriculum planners, Function of curriculum planners, Curriculum development strategies.

Introduction

Curriculum generally refers to the planned and unplanned experiences which learners receive in the process of their formal or semi-formal education for the purpose of becoming rounded persons who can make meaningful contributions to the betterment of their society and global environment. Curriculum is the total learning experiences of an individual not only in school but society as well (Bilbao, Lucido, Iringan, & Javier, 2008). Curriculum like education is a product of a wide array of actors (politicians, policy makers, curriculum workers, teachers, laypersons, targeted learners and so on). According to Ogunyemi (2009), curriculum is a process of achieving the goals of education through the formal/semi-formal educational set-up such as the basic/secondary schools, the colleges of education, the monotechnic/polytechnics, the adult literacy/innovative enterprise institutions and the universities. It is an embodiment of all the knowledge, skills and attitudes which a nation, through her schools impacts to her citizens. "Knowledge" here refers to all the facts, theories, principles, generalizations and rules needed to be acquired for a student to be certified as competent in a field.

It is clear that Technical and Vocational Education (TVE) is one of the effective solutions to unemployment, poverty and insecurity in both developed and developing countries. Audu (2019) sees technical and vocational education as that aspect of education which emphasizes skill acquisition, theoretical knowledge and good attitude. TVE is the type of education which prepares persons for gainful employment therefore, there is need for effective curriculum in order to achieve its goals. This special type of education provides socio-economic and sustainable development. For technical and vocational education to be effective the curriculum planners must put instructions that can solve human problems. Its curriculum must guide the instructional syllabus, lesson plan, lesson notes and methodology, offers teachers ideas and strategies for assessing student progress and what to teach and learn within time frame.

Technical and vocational education curriculum must also be separated from general education so as to achieves its national goals. The role of Technical and Vocational Education is to see that the individual is helped to identify his/her vocation and further develop his/her potentials scientifically and technically for occupational success. The effectiveness of technical and vocational education programme is determined by the curriculum package of the programme.

Delivery of Curriculum n Technical and Vocational Education (TVE)

An effective delivery of Curriculum in TVE through curriculum planners can be improved via the following strategies:

1. It should not only be developed by curriculum planners alone but also include committee of teachers, parents, and other stakeholders.

2. It should be compatible with the philosophy of the school.

3. A representative of activities to meet the needs of students with varying abilities and needs.

4. Linked to teacher's evaluation goals and professional development.

5. Must consider planned or formal and unplanned or informal curriculum.

Curriculum Planners

Curriculum planners are group or set of people who plan or develop, organize, and design the curriculum. Curriculum planners is a tool to help organizing various elements of a curriculum such as the core objectives to achieve subjects, unit definitions, activities, assessment and resources that a learner needs (Oliver & Beverly, 2010). Technical and Vocational Education (TVE) curriculum planners plan for the general and technical curriculum, plan for the implementers of the curriculum (teachers), plan for the classrooms, plan for the learners and plan for their studies effectiveness. The quality of any programme is often reflected in the quality of its planning. Good planning does not imply good programme without a great effort.

Curriculum planners are tasked with developing new curricula or improving existing curricula at a school. They may conduct research and make recommendations to the administration. TVE curriculum matters mainly because of its potential impacts on students and the nation. The fundamental purpose of curriculum planners is to ensure that students receive integrated,

coherent learning experiences that contribute towards their personal, academic and professional learning and development. The planning occurs at every stage of the educational enterprise and it is not an easy task because it involves a lot of decisions. The more guiding decisions taken the easier the plans for the actual curriculum decisions. These guiding decisions would include answers to such questions as: how can the curriculum be most effectively design/organized? Which are the sources of curriculum experiences? Who plans the curriculum among others?
The following are the people that plan the curriculum:

i. Curriculum experts
ii. Philosophers
iii. Psychologists
iv. Subjects specialists
v. Professionals etc.

FUNCTIONS OF CURRICULUM PLANNERS

1. Conduct Extensive Research Regarding Curriculum: These types of professionals spend a lot of time doing research to help decide what direction the school's administration, teachers, and students should go. They may look at studies or conduct meetings with different types of people in the field to help them decide what ways students should learn, how teachers should be trained, and what the students should be taught. They can analyze data from many sources, including test results and specific topics, to help guide them to the best strategy.

2. **Create Curriculum:** This seems like a very broad term; and it is. These specialists help to create curriculums for the school administration after doing extensive research. This includes deciding what students will learn and how they will learn; from choosing books, to deciding on testing requirements and creating a path that students will take. They will spend time reviewing and recommending textbooks, tests, and other educational materials to guide students down the specific curriculum they have created.

3. **Work with Teachers and Administrators to Implement Curriculum:** After these planners decide on and create a curriculum, they must then help the administration and teachers implement it. First, they must present their curriculum to the administration to be approved, and give them the plan on action for implementing said curriculum. After approval, they begin conducting meetings, training sessions, and other means of education. They must ensure that everyone is on board so to speak, so that the curriculum is being taught in a streamlined manner. These specialists may also mentor or coach teachers on improving their skills so that they may better teach the curriculum.

4**. Recommend Changes:** This function goes hand-in-hand with the research side of the job. Curriculum developers must make recommendations based on a variety of different factors, like the research they have done, test evaluations, student/teacher happiness, and effectiveness. These curriculum planners can make recommendations regarding "teaching techniques and the use of different or new technologies," for example, as stated by the Bureau of Labor Statistics. It is their job to ensure that everyone has to tools necessary to implement the curriculum, from books, to tests and technologies.

5. Continue Monitoring and Training Curriculum: These specialists' jobs aren't over simply after they have created and implemented the curriculum. They must continue monitoring progress, including conducting studies, sitting in on teachers' classes, and making recommendations. They can conduct training or recommend changes to teachers to better help them. They must not only ensure that the new curriculum is being used, but that it is being followed correctly. This kind of monitoring can also allow planners to make adjustments and changes to the curriculum to better suit necessary needs.

According to Laurie Kimbrel (2016), Curriculum development determines the type of information that is taught in schools, as well as how it will be taught, and who will teach it. The four basic stages involved in the curriculum development process are briefly discussed below:

1. **Planning**: during this stage, the specific development steps are laid out. The idea or issue that is being addressed is determined and a curriculum development team is formed. Once professionals are gathered, they look over changes in the content area and assess the needs of the students.

2. **Content**: as the team moves into the second stage, their focus turns to the intended outcomes of the curriculum, the program's unifying framework, and the content they are focusing on. After that, new methods of teaching said content are created.

3. **Implementation:** finally, the new designs and methods are put into play. Facilitators must be carefully trained in the new curriculum and any revisions should be made based on how the new program is received. Not every plan result in the desired goals, so developers must be willing to change things.

4. **Evaluation**: as the curriculum's use continues, it may require updates as the world progresses. New content may be added in while old content might be removed. Additionally, the curriculum may start to fail with newer groups of students, thus requiring another redesign.

SPECIFIC ROLES OF CURRICULUM PLANNERS

i. Facilitate curriculum planning, i.e. the development of Learning Programmes.

ii. Work Schedules and Lesson Plans to ensure effective curriculum delivery.

iii. Assist teachers to improve learner performance in achieving the Learning outcomes.

iv. Provide teachers with guidance on Assessment, including Continuous Assessment (CASS) and other appropriate Learner Assessment strategies.

v. Develop systems and templates for recording the progress of learners towards the attainment of Learning Outcomes.

vi. Support initiatives to improve mathematics, science and technology.

vii. Promote a culture of learning and teaching.

viii. Assist schools with the selection and effective use of curriculum material.

ix. Implement professional development systems and structures that are in line with policy frameworks and plans.

x. Identify, assess and meet the professional development needs of teachers.

xi. Plan teacher development activities in line with policy frameworks to address the needs of teachers.

xii. Provide support for teacher development in line with the appraisal systems
xiii. Participate in agreed upon teacher appraisal processes where necessary

xiv. Encourage teachers to access the latest research in the field of curriculum and create opportunities for teachers to do this.

xv. Provide teachers with information on Higher Education Institutions degrees/courses and bursaries to encourage further study.

xvi. Facilitate the establishment of Phase and Learning Area/Subject/Field Committees at district/circuit/cluster/school levels.

xvii. Facilitate the orientation, training and sustainability of committees.

xviii. Facilitate the establishment of reporting procedures.

xix. Evaluate the functionality of committees and address challenges.

xx. Facilitate communication strategies using school and curriculum structures.

xxi. Use Information and Communication Technology (ICT) to gather and disseminate Information.

xxii. Establish systems for collecting, analyzing, presenting, storing and updating data.

xxiii. Monitor the implementation of curriculum and related policies on a regular basis.

xxiv. Implement systems to track progress of curriculum implementation with respect to planning, teaching, learning and assessment.

xxv. Identify specific areas for evaluation in terms of curriculum planning, implementation and assessment, as well as co-curricular activities.

xxvi. Design and develop evaluation plans and tools to ensure effective, valid and reliable data

Technical and Vocational Education (TVE) curriculum organization can be said to mean the arrangement or coordination of things in a way that would help achieve anticipated purposes. To help the (TVE) curriculum specialists answer the question of "How can the curriculum be most effectively organized?" There are four major models or designs of organization to be considered during planning stages and these are.:

i. The subject centered curriculum design.
ii. The broad fields curriculum design.
iii. The activities/experience curriculum design.
iv. The core curriculum design.

Technical and Vocational Education (TVE) curriculum development is planned, purposeful, progressive, and systematic process to create positive improvements in the educational system and national development due to changes around the world. Therefore, there is a need to update them to address the society's need through constant review of TVE curriculum as provided by the educational planners. Through educational system, there are five key components and elements of curriculum development that educational planners need to be considered. According to Umar (2012) cited Herrick and Tyler, the followings are the components and elements of curriculum development that can be adopted for TVE:

1. **Situational analysis:** Situation analysis means the analysis of different conditions such as emotional, political, cultural, religious and geographical condition of a country. This will help the curriculum planners in the selection of organization of learning materials and in suggesting appropriate evaluation procedure.

2. **Formulation of objectives:** there are four main formulating the objectives of education. These are: the society, the knowledge, the learner, and the learning processes, all of these factors are to be considered while selecting and formulating the educational objectives.

3. **Selection of content:** One of the important elements is the selection of content for a subject. At the time of subject matter selection, the following factors are to be kept in mind: Available sources and resource, Demand of the society, International needs, Level and age of the learner or student, Methods of content organization, Number of courses offered, Quality and qualification of teaching staff, Scope of subject matter, System of examination, and type of society and culture.

4. **Strategies and Method of Teaching:** These are strategies and methods of teaching adopted by the teachings during instruction and learning experiences. This will certainly not fair to ask a teacher for achieving certain objectives without giving any guidelines. In most of the country's curriculum development is a centralized process. Teachers are not directly involved in this phase. Most of the teachers do not know the process of achieving desired goals. After determining the goals and objectives the next problem is the selection of strategies and methods of teachers. What we should give to our students. Should a curriculum be fixed or flexible, constant, common or differentiated.

5. **Evaluation:** Evaluation is one of the dynamic process, which needs a continuous research and evaluation for its betterment in order to cope with the variable demands of the society and bring about desirable changes. Curriculum evaluation is not a student evaluation. It is a broader term being used to make judgement about the worth and effectiveness of it. With the help of evaluation phase experts can modify the curriculum by bringing about desirable changes.

CURRICULUM DEVELOPMENT STRATEGIES

The curriculum development strategies are the same for all the levels of education but the curriculum contents differ at each level because the aims and objectives differs at each level. There are various curriculum development bodies and subject association in Nigeria and they all exert influence on the selection of the curriculum content at different level of educational system (Raymond, 2019).

The strategy for curriculum development for all the levels of education is usually the same. But the curriculum content and organization are usually different at each stage or level because the aim and objectives vary from one level to another and various teaching methods are required at various levels and at various grade within the levels.

When planning curriculum, the experts on test and measurement will be there to evaluate the curriculum. Measurement makes available the pertinent information and evaluation judges the "worth" or "value" of that information (Nworgu, 2009).

Conclusion
Curriculum as a field of study with its own methods, theories, and ways of solving problem has influenced by history and philosophy. One can believe that no single philosophy, old or new, should guide decision about school and curriculum. Curriculum planners need to help improve and design school practices in harmony with history of curriculum and philosophy of the school and community.

Technical and Vocational Education (TVE) curriculum must be developed to preserve the country's national identity and to ensure its economy's growth and stability. There must be a chain of developmental process to develop a society. Hence, TVE curriculum development matters a lot in setting the direction of change in the society, not only at the micro but also at macro levels. As long as the goals and objectives of TVE curriculum development are clear in the planners' mind, cutting- edge achievements in various concerns can be realized (Bilbao et al., 2008).

Recommendations
Based on this study, the following recommendations were suggested:

1. Establish effective channels of communication, between province and district, district and schools, and with other directorates and sections, teacher unions and other stakeholders.

2. In the matter of curriculum development, the competences of the developers/planners at any level of education should be properly checked.

3. There should be affiliation to relevant professional bodies.

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IMPACT OF LAND EXCAVATION ON THE ENVIRONMENT AND HEALTH OF THE RESIDENTS OF OBAJANA, KOGI STATE, NIGERIA

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Abstract
This study examines the environmental and health impact of land excavation in Obajana area of Kogi State. The study utilized Idrisi TerrSet and ArcGIS software for the processing and classification of the satellite images (1998, 2008 and 2018). These were used to classify LULC into five classes from 1998 - 2018 to analyze the changes therein. The results obtained show that the proportion of area covered by built up land, was on the increase, whilst there is decline in other land cover types in the study areas. Result from magnitude of change further reveals that 33.25% of vegetation land and (16.77%) of agricultural land is been lost annually in the area for 20 years. Analysis of questionnaires from respondents indicate that the people are affected by the excavation activities as this resulted in chest problems, respiratory infection and eye infections. The study concludes that these land use and land cover changes lead to health problems, environmental degradation, biodiversity loss, etc. The study recommends that constant monitoring of changes in land use/land cover be put in place as appropriate response machinery in line with the towns and regional master plan to maintain sustainable development and healthy environment on the study area.

Key words: Land use, land cover, change detection, image classification, land excavation

Introduction
Studies have shown that many ecosystems are influenced by disturbances such as e.g. land-use, fragmentation, fire and floods or storms. This land-use fragmentation finds its expression in the form of quarrying (Ukpong, 2012), foundation excavating and mining. For instance, Missanjon, Ndalama, Sikelo and Kamanga-Thole (2015) established a perpetual relationship between plants and their physical, chemical and biological environments where dust emissions from a quarry location affected plants chlorophyll content. According to Nwibo *et al.*, (2012), the quarrying activities have adverse implications on workers, society and cultural heritage, natural environment and communities in close proximities. Whereas Ming'ate and Mohamed (2016) also describe explosives used in quarries as potentially dangerous to both human beings and the environment. Nartey et al. (2012) and Adeola *et al* (2009), four million deaths are reported annually from acute respiratory problems in developing countries owing to aggravated environmental pollution emanating from quarrying, sand blasting and emission of dangerous chemicals.

Due to land use activities of this kind, the earth surface is being gradually altered in some manner and this has had a profound effect on the natural environment, thus resulting in an observable change in the land use-land cover over time (Sreenivasulu, Jayaraju and Lakshmi, 2014). Lad & Samant (2014) noticed that quarries in Lebanon had expanded to 63% between 1989 and 2005 to cover 5,267 hectors. Similarly, in Ghana, the emerging desertification in the northern region was closely associated with the loss of indigenous tree species destroyed through extensive extraction of gravel and sand materials demanded by the construction industry (Musah & Barkarson, 2009). As much as the industry has its share of challenges some highlighted in this study, its' also true that stone mining is a lucrative business that supports thousands of families.

The Obajana being a region of interest as far as quarrying is concerned; this study undertook an evaluation on the environmental and health impact of land excavation in Obajana area of Kogi State. The specific objective were to examine a land use land cover of the study area, to quantify the magnitude of change in distribution of land use land cover types (TM) of 1998, (ETM+) of 2008 and (OLI) of 2018 and to evaluate the environmental and health implications of the excavation activities using medical records from the hospital.

Location of the Study area

Obajana town is situated in Kotonkarfi, Kogi state, Nigeria. Its geographical coordinates are latitude 6° 24' - 6° 27' North and longitude 7° 54' - 7° 56' East. The blueprint (2012) reported that Obajana town used to be a very small village within the Oworo community, which means "a place of substance that provides for everyone." However, the place was hitherto barely known, but with its present status as the home of the Dangote cement, it has since assumed international recognition. It is about 45km from Lokoja and 220 km southwest of the Federal Capital Territory (FCT) whose greatest fortune is a large deposit of limestone, which is the most important raw material for cement production. Obajana town is bounded by nearby towns such as Zariagi, Lokoja, Oshokoshoko and Kabba.

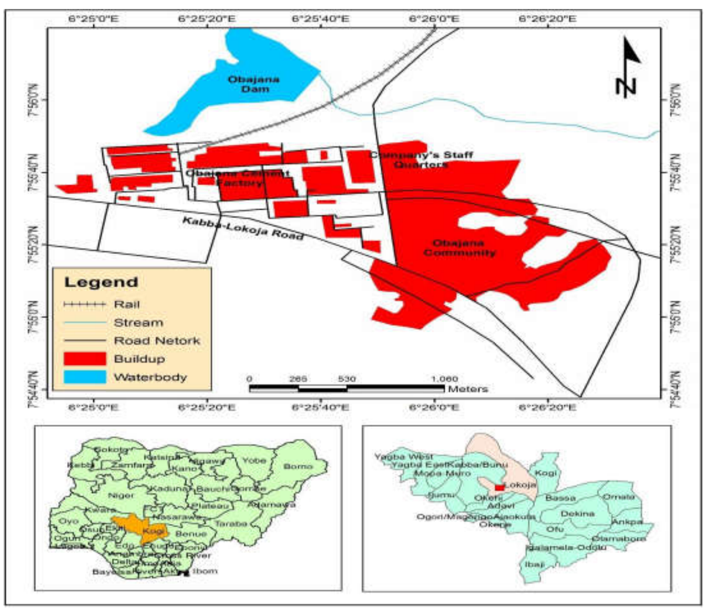

Figure 1. The Study Area (Obajana, Kogi State Nigeria)
Source: Kogi State Ministry of Land and Surveying (2018)

Materials And Method

The research made use of Idrisi TerrSet, ArcGIS software and the Statistical Package for Social Science (SPSS). Idrisi TerrSet was use for band combination, image classification and to calculate the normalize differential vegetation index (NDVI) of Obajana. ArcGIS 10.2 was used to clip the boundary of the study area and calculate the area in square kilometer of the resulting land use land cover classes for each study year. The comparison of the land use land cover statistics assisted in identifying the percentage change, trend and rate of change between 1998 and 2018. Three bands were used to form the false colour composite for this study. Only bands 4, 3, 2 will be used for Landsat 7 ETM images while bands 5, 4,3 will be used for Landsat

8 OLI. The band combination operations were carried out in ArcMap 10.2. On each of the satellite images in question (1998, 2008 and 2018), the area of interest that is the study area, were "Clipped out" using the X,Y coordinates of a point on the right upper corner and the X,Y, coordinates of another point on the left Lower corner. This task was also performed on Idrisi TerrSet. Sample sets were then created for all the images; built-up area, agricultural land, bare land, vegetation and water body.

The images were subjected to a supervised classification using the maximum likelihood. This task was performed using the classifier tool on the operation list of Idrisi TerrSet. The area of each sample set was determined in square kilometers. The classified images were exported to ArcGIS 10.2 software where the boundary area of Obajana was "Clipped".

Questionnaires and interview were used as tools of data collection. The questionnaires were administered to quarry workers, and people living next to the quarries to gather the information required. Data were obtained from hospitals to check the periodic prevalence rate for common health challenges. Stratified random sampling was done to get the target population of 183, which was used to gather data. The information collected was analyzed using SPPS for cross tabulation and to generate frequencies and statistical graphs for the interpretation of data.

Results And Discussions

Classification of the various Land use/Land cover Map of Obajana (1998, 2008 and 2018)

Landuse and landcover Analysis of 1998 imagery of Obajana (Figure 2) reveals that vegetation land areas was the most dominant land cover features covering about 20.3769 (Km^2) (40.99%) of the area. Agricultural land areas follow this, which covers an area of 18.0306 (Km^2) (36.27%) of the total landmass of the area. Also, bare surface accounted for 7.083 (Km^2) (14.25%). In addition, built up areas cover an area of 3.5289 (Km^2) (7.1%). This land use indicates that in 1998 they were only small settlements in the study at that time across the study area.

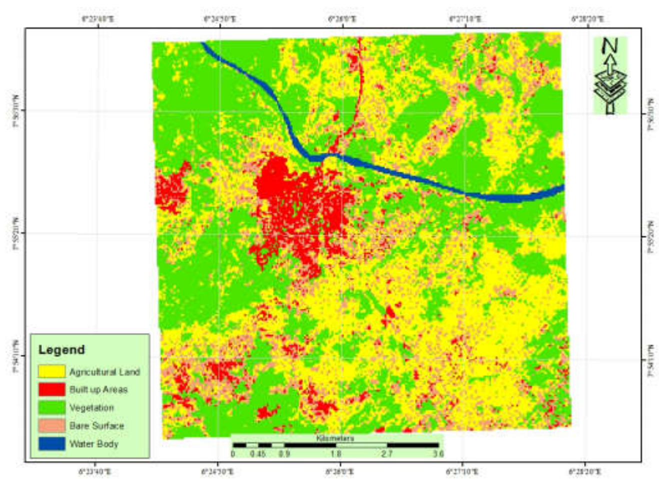

Figure 2: 1998 Land use/Landcover distribution Map generated from LandSat 4 TM

Analysis of 2008 land use and land cover imagery

Figure 3 shows the LULC of the study area for 2008 which indicates that agricultural land areas and vegetation has decreased within the ten –years (10) time period from 18.0306 (Km^2) (36.27%), 20.3769 (Km^2) (40.99%) in 1998, now accounted for about 17.667 (Km2) (35.54%), 16.9092 (Km^2) (34.02%) respectively. On the other hand, built up areas and bare surface has increased from 3.5289 (Km2) (7.1%) in 1998 to 7.0155 (Km^2) (14.11%) in 2008 and bare surface from 7.083 (Km^2) (14.25%) in 1998 to 7.3575 (Km^2) (14.8%) in 2008 respectively. This indicates that expansion in built up and other developmental activities has reduced both forest and farm land area cover.

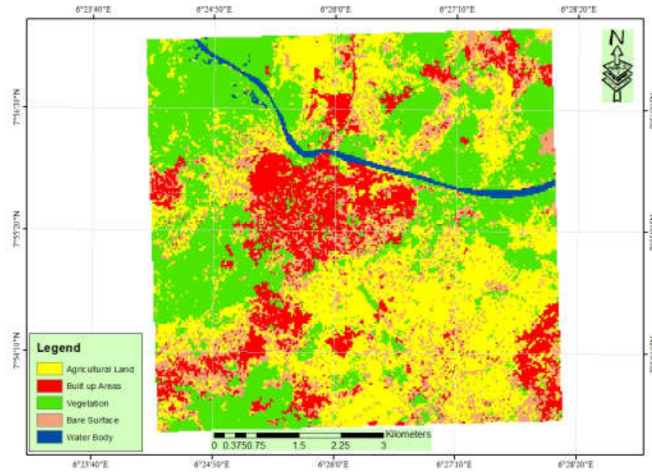

Figure 3: Classified 2008 land use land cover distribution of the study area generated from LandSat 7 ETM+

Analysis of 2018 land use and land cover imagery

Figure 4 show that in 2018, there was an increase of built up areas by 3.4614 (Km^2) (6.97%) within the ten years' period. This increase is attributed to continuous influx of people to the area for one purpose or the other. Similarly, vegetation land cover has also decreases from 16.9092 (Km2) (34.02%) in 2008 to 14.7195 (Km^2) (29.61%) in 2018. Agricultural land on the other hand decreased slightly further to 15.1776 (Km^2) (30.54%) in 2018 from 17.667 (Km2) (35.54%) in 2008. Furthermore, bare surface covers an area of 8.4087 (Km^2) (16.92%) in 2018 due to conversion from other land cover while Water body increase to 0.9216 (Km^2) (1.85%) in 2018. This increase can be attributed to the presence of dam in the area.

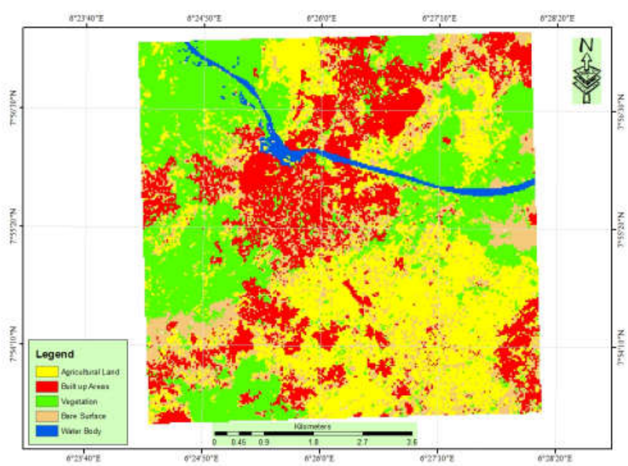

Figure 4: 2018 land use land cover distribution generated from LandSat8 (OLI)

Aerial Extent of Land Use Land Cover Distribution over the Study Area

The figures presented in table 1 represent the static area of each land use land cover category for each study year. Built up in 1998 occupies just 7.1% in 1998 and increased to 14.11% and

21.08% in 2008 and 2018 respectively. Vegetation occupies the highest area of 40.99% in 1998 and continues to decrease to 34.02% and 29.61% in 2008 and 2018 respectively.

Table 1 land use and land cover Distribution of Obajana (1998, 2008, and 2018)

Classification Category	1998		2008		2018	
	Area (Sqkm)	Area covered (%)	Area (Sqkm)	Area covered (%)	Area (Sqkm)	Area covered (%)
Agricultural land	18.0306	36.27	17.667	35.54	15.1776	30.54
Built up	3.5289	7.1	7.0155	14.11	10.4769	21.08
Vegetation	20.3769	40.99	16.9092	34.02	14.7195	29.61
Bare surface	7.083	14.25	7.3575	14.8	8.4087	16.92
Water bodies	0.6912	1.39	0.7596	1.53	0.9216	1.85
Total	49.7088	100	49.7088	100	49.7088	100

Magnitude and Percentage of Change in LULC between 1998 and 2018

The magnitude of the change of the various land use and land cover for the 20 - years period from 1998-2018 reveal that, the vegetation land cover is the most affected land use and land cover category reason been that it was the largest land cover type from the base year of 1998. It is on the decline as it lost 5.6574 (Km2) (33.25%) to other land cover category (Table 2). This was higher than the change reported by Jande and Amonjenu (2018) in Apa local government area of Benue State Nigeria. It was also higher that the rate reported by Oyinloye *et al.* (2018) in some state forest reserves in Southwestern Nigeria.

Table 2: Magnitude and Percentage of Change in LULC between 1998 and 2018

LULC Class	1998 Extent (Km^2)	2018 Extent (Km^2)	Magnitude of Change (Km^2)	Percentage of Change
Farm land	18.0306	15.1776	2.853	16.77
Built up	3.5289	10.4769	-6.948	40.84
Vegetation	20.3769	14.7195	5.6574	33.25
Bare surface	7.083	8.4087	-1.3257	7.79
Water bodies	0.6912	0.9216	-0.2304	1.35
Total	49.7088	49.7088	17.0145	100

Environmental and Health Implications of the Excavation Activities

The quarrying activity has several effects on the environment; this is evident by the number of response that was gotten from the people living near the quarry.

Majority of the resident complained of shock, vibration and dust as indicated in Table 4. 34.6% of the residents of Obajana complained of dust, 26.9% of the residents complained of noise that resulted from the blasting and the heavy trucks that were used for transportation, and 33.8% experienced shock and vibration. This finding corresponds with (Aigbedion, 2005) whose study concluded that plenty of dust from the cement factories and mining operations in the Nigerian limestone quarries caused many problems with people living near the quarries.

Table 3. Effect of quarrying activities to the environment by resident

Effects	Response	Percent (%)
Dust	45	34.6
Noise	35	26.9
Shocks	25	19.2
Vibration	19	14.6
None	6	4.6
Total	130	100

Health Implication of Excavation Activities Records of common health problems were retrieved from nine health centers in Obajana area and aggregated for each study year (2008 to 2018). These records were ranked in the order malaria, chest problem, respiratory infection, common cold and eye infection. As shown in figure 6, malaria and common cold were found to be prevalent between the year 2008 and 2018. This might not be directly as a result of the quarrying activities in the area considering the fact that Obajana Cement Factory commenced their quarrying operations in the year 2012. However, the year 2012 to 2016 witnessed a dramatic turn as other health problems like cough, respiratory infection and eye infection were found to be on the same level as both malaria and common cold. In 2015, the frequencies of these illnesses (i.e. chest problems, respiratory infection and eye infections) were consistently higher than malaria.

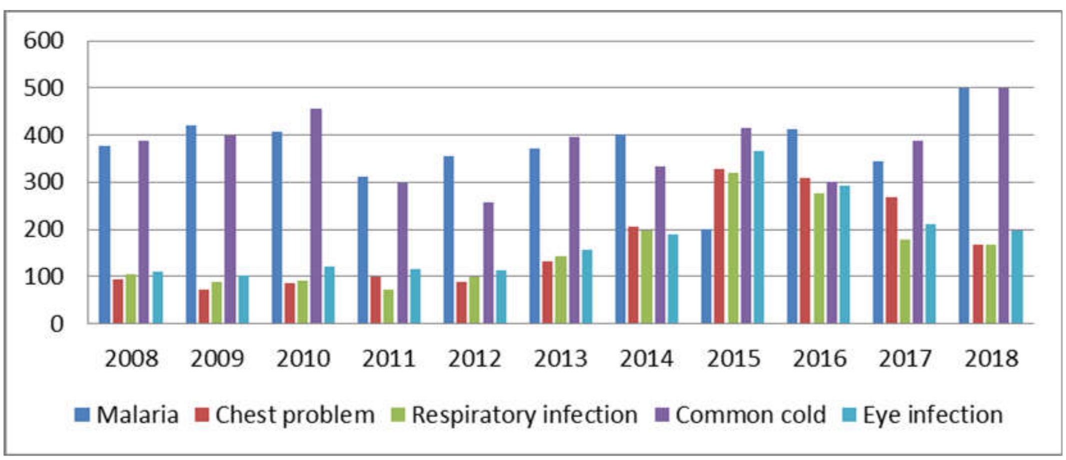

Figure 6. Rate of hospitalization for common health problems from the study

Conclusions And Recommendation

The study has established that there was a tremendous change in the land cover and land use of Obajana during the 20 years period from the 1998 -2018 with the use of geospatial Techniques. The magnitude of change of built up area between 1998 and 2008 is 43% per annum, while that of 2008 and 2018 was 37% per annum.

The study further established that quarrying activity in the area has affected the environment by leaving scares on the surface, which are not easy to rehabilitate, this has rendered part of the area uneconomical. Dominantly, individuals employed and residing within the excavation sites were discovered to regularly endure coughing, wheezing and eye issues.

Based on the findings of this research the following are recommended

a) It is important to manage, monitor and control statutory changes in agricultural land through a robust environmental management plan that considers proper land use/land cover management, ecological restoration and fortification water sources to agriculture

b) From the research, it revealed that a lot still need to be done in adoption of an appropriate urban planning and zoning with impact studies and scenarios, in order to protect agricultural lands from urbanization encroachment hence this research may be adopted and used as a source for planning and management in Obajana.

c) Compliance monitoring visits to quarry sites should be done routinely to minimize the negative effects of quarrying operations on human health and the environment. Ensure that the EIAs are carried out regularly.

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SCIENCE AND TECHNOLOGY EDUCATION CURRICULUM IN NIGERIA: ISSUES, CHALLENGES AND THE WAY FORWARD

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Abstract
Science and technology education is a vital tool for skill acquisition if Nigeria is to be named among the countries that are technologically independent. In the infinite search for knowledge leading to the development of cognitive, affective and psychomotor domains, the sure tool for the promotion of development in Nigeria in the 21st century is Science and Technology. This is because the application of its knowledge will enable its beneficiaries to solve the ever occurring challenges of life in society. The training of personnel who are technologically inclined is a challenge in Nigeria. The other is the curriculum that is not 21st century compliant and has little or no relationship with workplace. This paper examined some of the curriculum issues and challenges of science and technology education in Nigerian secondary schools and suggests ways of improving the teaching and learning of science and technology with greater interest and enthusiasm. It also suggests among other things that priority attention should be given to science based education in the country's educational planning as well as following up such plans with genuine commitments at the level of implementation so that Nigeria like other countries can maximize the gains of a well-planned, funded and executed science education program.

Keywords: Science and Technology, Curriculum, knowledge and skill acquisition.

Introduction
The 21st century world is driven by science and technology. Okebukola, (2005) describes science and technology as the engine for national growth and development. It is therefore understandable that nations across the globe place emphasis on science education.

Science and technological growth in particular identifies the status of any nation in the global village. Science is a systematic body of knowledge while technology is practical application of knowledge to achieve results and our value concepts guide us as to what we ought to do with both. Hornby, (2010) describe science as knowledge of principles and causes, which can be tested to ascertain their truth. Science came as part of the school's curriculum in Nigeria like any other African countries, through the influence of the colonial masters (Yoloye, 1994). Up till early 1960's science was given relatively little attention. Yoloye, (1999) noted that what was taught in the primary schools then could only pass for Nature study, Hygiene (Health Science), Rural science and Gardening. The objectives were simply for the development of clean and healthy habits; gaining knowledge of nature, specifically plants and animals; and of principles and techniques of farming. This type of science dominated by Nature Education got a boost through the funding provided from foreign government as a result of their strong determination to develop their newly independent Africa states.

In 1978, at the National level the primary school committee of the joint consultative council set up a reference committee which was to come up with a core curriculum for science education at the primary school level in Nigeria. This curriculum was published in 1980, modified in 1984 and revised in 1991. Primary science was included in the curriculum of primary education so as to achieve some specified goals and objectives (Federal Ministry of Education, 1998). Osokoya, (2002) stated that all students of science, at whatever level are expected to be exposed to learning that can develop traits of science in them. The development should be such that their knowledge of science and experiences gathered should be geared towards applying it to solve practical real life problems. The primary school is just the right place to start laying foundation of such development. Primary education is supposed to be given in an institution for children aged 6-11 + years. This level of education aims among other things to inculcate permanent literacy and numeracy and to lay a solid basis for scientific and reflective thinking (Federal Republic of Nigeria, 2004).

The Universal Basic Education (UBE) in Nigeria was launched as a consequent to the world declaration of Education for All (EFA) in the Jomitten conference of 1999 in which Nigeria was a signatory. The UBE was launched in 1999 as an instrument per excellence in which the laudable goals of EFA was to be achieved by year 2010. Two of the core subjects through which the goals of education could be achieved are Basic Science and Technology and Basic Science which were formerly Primary science and Integrated Science in Primary School and Junior Secondary School respectively since the year 2005. However when the Federal Government of Nigeria declared the 9-year basic education programme, there were series of revision, restructuring and re-alignment of the Basic Science and Technology Curriculum. This was done more especially to meet up with the targets of the context of National Economic Empowerment Development Strategies (NEEDS) and the Millennium Development Goals (MDGs). The new Curriculum became operational in 2008. The new BST curriculum covers three strands of basic education in Nigeria. The strands are lower basic education (primary 1-3); middle basic education (primary 4-6) and upper basic education (Junior Secondary School 1 – 3). At the Junior Secondary School however, the subject is split into Basic Science and Basic Technology for more in-depth teaching and learning of the rudiments of science and technology respectively.

Concept of Science Education

Science education according to Buseri, (1995) is the application of educational (learning) theories especially those based on the philosophical, sociological and psychological perspectives in the endless search for knowledge, resulting in the development of the cognitive, affective and psychomotor domains through some systematic processes involving careful observation, deduction and testing by empirical means. And for the purpose of teaching, Buseri, (1995) opined that, it is the process whereby persons (teachers inclusive) are prepared or equipped with knowledge and skills to help ensure the effective dissemination and inculcation of scientific concepts, culture and thinking process and activities through generally accepted pedagogical strategies and tactics, based on the application of learning (teaching) and educational theories. These no doubt are vital tools for national development of any country including Nigeria. Due to its utilitarian value to national development, every effort should, therefore, be made to promote its development by any state that wants development. Nigeria as a state yearning for development can, therefore, not shy away from it in its developmental agenda.

Concept of Technology Education

Technology education which is synonymous with technical education, industrial technical education and industrial arts is defined by the National Policy on Education (FRN, 2004) as an aspect of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life.

Issues in Science Education Curriculum

The new BST curriculum has been in operation since 2008 and teachers have been mobilized for its effective and total implementation across the country. Experience has shown that the present form of science taught in Nigerian schools does not prepare pupils to function well in a society undergoing transition from a rural economy to a modern economy. However, some problems have been identified to be hindrances to this desired goal. Some of the problems as earlier envisaged by NTI, (2010) include: inadequate supply of curriculum module, inability of the basic science teacher to meaningfully interpret the performance objective, skipping unfamiliar concept or area, Inability to organize activities for pupils, skipping activities where materials are not readily available, inability to identify sources of teaching aid, lack of assessment skills, brushing the pupils to complete the scheme of work etc. The inability to achieve the goals of BST curriculum at the primary school may be dependent on how teachers manage the resources at their disposal.

Challenges facing Science and Technology Education Curriculum at Basic Education level

According to Emmanuel and Iheanyi, (2016) attainment of goals has been constrained by challenges. Notable among them are the nature and scope of the curriculum, teacher qualification and professional development, political interference, inadequate funding, dearth of trained teachers, lack of incentives and inadequacy of facilities, in no particular order of magnitude of adverse impact. Some of these challenges are explained below.

Nature and Scope of Basic Science and Technology Curriculum

Table 1 show that basic science and technology is a composite subject curriculum. The composite nature of the basic science and technology curriculum was also highlighted by

Obioma, (2012). This was part of the 2012 revision of the Basic Education Curriculum.

Theme	Primary Sub theme	JSS Sub theme
Basic Science	•Exploring our Environment •Living and Nonliving things	• Learning about our Environment •You and Energy •Science and Development
Basic Technology	•Understanding Basic Technology •You and Energy	•Understanding Basic Technology •Materials and Processes •Drawing Practice •Tools, Machines and Processes •Safety
Physical and Health	•Fundamental Movements •Basic Movements •Athletics Games and sports	•Basic Human Movement •Sports and Games •Health Education

	Health Education •Pathogens, Diseases and Prevention •Drug Eradication •Responsible Parenthood	•Moving our body parts Athletics •Contact and Non Contact Games
Information Technology (IT)	•Basic Computer Operations and Concepts •Basic Concepts of information Technology	•Basic Computer Operations and Concepts •Computer Application Packages •Basic Knowledge of information Technology

Source: FME in Igbokwe, (2015) Table 1: The structure of basic science and technology curriculum

The revision of the 2008 – 2011 Basic Education Curriculum to the 2012 – date edition was necessitated mainly by the need to reduce curricula overcrowding in terms of subject offering (Okoroma, 2006). However, the reduction of number of subjects affected the basic science and technology curriculum negatively. It resulted to making basic science and technology a composite subject comprising basic science, basic technology, physical and health education and information technology as themes (see table 1). Consequently, basic science and technology became over-loaded in content. The content overloading is a constraint to effective science education practices in basic science classrooms. Each of the components requires different but inevitable facilities for effective teaching and learning. These cannot be provided for the implementation of the curriculum, especially when the cluster is viewed as a single subject. Another inherent problem is the challenge of getting subject teachers who are professionally endowed to effectively teach all the components. No doubt there can hardly be a single teacher that has the capacity to effectively teach and assess the contents and skills of all the components of the cluster. As noted by Obioma, (2012) it is difficult to return and interpret assessments scores as indicator of learners' performance in a composite curriculum. The curriculum as it is was designed for the formal education sector. The implication is that the almajiris, the nomadic learners and other out-of-school learners have not been covered. The failure to adapt science and technology education to the learning needs of the non-formal sectors has excluded a vast number of basic education learners from gaining the knowledge of basic science education practices.

Inadequate training and professional development programmes

The type of pre-service training and inadequate professional development programmes for serving teachers constitute challenges to proper integration of science education practices in the basic science and technology. Teachers' professional development encompasses pre-service development programmes. FRN (2004) puts the Nigerian Certificate in Education (NCE) as the least qualification for a teacher in Nigeria. The NCE teacher at the Basic Education level is made to teach all the subjects offered (including basic science and technology) in his class. Similarly, at the upper basic level the basic science teacher is expected to teach all the components of basic science, contrary to his pre-service training. The pre-service teacher programmes at Colleges of Education and Universities are patterned along single subject departments where teachers are prepared to teach basic science, computer science, technology or physical and health education. Teacher development aims at exposing teachers to the knowledge of content, skills, pedagogy and skills for the assessment of teaching and learning outcomes (Obioma, 2012).

Dearth of trained basic science teachers

Odili, Ebisine and Ajuar, (2011) stressed that the teacher is a critical factor in the successful implementation of any educational innovation. This view is in line with the declaration by FRN (2004) that, no education can grow above the quality of the teachers. Accordingly, the teacher's understanding of the curriculum objective, contents, materials and methods is crucial for its effective delivery. Odili, Ebisine and Ajuar, (2011) found that basic science and technology teachers do not have clear knowledge of the content and objectives. They are therefore, not guided by the document in their lesson preparation and delivery. Most of the basic science teachers were not trained with the philosophy content, delivery skills and assessment skills required for effective Basic Science and Technology education in view. They are not therefore professionally disposed to teach the subject as no educational enterprise can rise above the teachers' competence (Nwachukwu, 2012). Also of concern is the fact that even the available graduate in science education never specialize in all the components of BST (basic science, technology, computer science/IT and physical and health education). Again most of the teachers at the lower and middle basic levels were not trained to teach science but are engaged in doing that. The basic education programme is therefore critically challenged by dearth of trained teachers that can teach basic science and technology at all levels. This is in line with the finding of Ige, (2014) that prevalence of unqualified teachers in schools pose threat to the quality of education. The result is that BST is being taught by mostly teachers who are not equipped professionally to teach them.

The way forward

1. Changes in scientific theories and the advent of new technologies to facilitate classroom teaching of basic science and technology concepts make it imperative that teachers, especially those who obtained their teaching qualifications several years back, should undergo in-service training or Continuous Professional Development (CPD) on regular basis. It is necessary for teachers to keep abreast of the latest developments in their professional area. Many teachers who got their teaching qualifications several years ago might still hold the view that things believed yesteryears are applicable today. Indeed, Harlen and Holroyd, (1997), and Summers and Kruger, (1994) show that many teachers hold views that are at variance with that of science.

2. The Basic Science and Technology Curriculum should be reviewed with the view to reducing the contents and make its goals achievable. This can be done by removing from the curriculum topics that do not have direct bearing on the learners' immediate environment. The curriculum should be made available to every teacher of basic science and technology.

3. The science and technology curriculum should not be a straight-jacket single document. Versions of the curriculum adapted to the learning needs of all the segments of the basic education should be developed. This will make basic science and technology inclusive, taking care of the formal, non-formal, almajiris and nomadic segments of the basic education. To make the adaptation effective, there should be special training programmes for teachers of basic science and technology to be able to adapt to the special features.

Conclusion

There is general acceptance of the fact that development could only be meaningful if and when it is science and technology driven. Growth and development of science and technology is dependent on the effectiveness of science and technology education. Basic Science and technology education is the fundamental science and technology project. It is the vision of the basic science and technology programme in Nigeria to facilitate the socio-economic development of the country. Science and technology should be taught and learnt in such ways that the basic education learner will embrace science education practices as part of his overall education to achieve this vision. This cannot be achieved in the face of the prevailing constraints to the process of science and technology education in Nigeria. This makes it expedient that every stakeholder should play positive and conscious roles to see to the implementation of the way forward in order to find solutions to the constraints to effective science education practices in basic education programmes in Nigeria.

Recommendations

1. Adequate fund should be made available to Colleges of Education and Faculties of Education in the Universities to enable them effectively discharge their responsibilities of producing basic science and technology teachers. Such special funds should also be used to retrain science educators in the colleges and universities to increase and re-align their capacities along the line of the innovations in the basic science and technology programme, and hence facilitate science education practices in basic science and technology delivery.

2. There should be workshops for all the teachers who teach basic science and technology at all levels of basic education. The outcomes of the workshops should enable the teachers to align the philosophy and goals of the curriculum to the contents, activities, pedagogies and assessment skills. By so doing the teacher would be more endowed with the professional background to enhance effective science education practices.

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CURRICULUM IN TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING FOR THE SUSTAINABLE DEVELOPMENT GOAL IN NIGERIA

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Abstracts
As Curriculum is the best mean of in general improvement of understudies. Also, instructor is middle person among Curriculum and understudies. She/he knows different needs of understudies, instructive organizations, ventures, guardians (partners). The nature of educator training is kept up by educational plan of Teacher Education. The Curriculum advancement is dynamic procedure Sustainable Development is just conceivable if there is a minimum amount of talented individuals as there are expanded capital returns when the degree of training goes higher and this will drive the country out of the center pay into high economy. Innovation and Vocational Education and Training (TVET) will assume a crucial job in the arrangement of talented workforce required for the nation's monetary change. Accomplishing economical advancement has been extremely tricky particularly in the creating nations. The improvement of Vocational and Technical Education has been attacked by various unconventional issues influencing its smooth usage. These include: political flimsiness, poor occupation execution, instructors' strikes, debasement and the mission for material riches, dependence on remote work, the area of schools, poor frames of mind to work, and poor association and organization of professional training. (Osam, I. 2013). TVET likewise expects to set up how learning administration can be used to accomplish feasible improvement through TVET in Nigeria and over the long haul check difficulties exuding from unseemly preparing techniques which lead to non utilitarian instruction and absence of value in some information supply chains bringing about absence of deep rooted employability. All curriculum Stakeholder in TVET needs to look forward on the best way to build up our educational program in other to support the necessities of our nation.

Keywords: Curriculum; Technical; vocational; Education; Development.

Introduction
As per Pratt (1994, p.5) and Barrow and Milburn (1990, p.84), "Educational program" is gotten from the Latin action word currere, "to run." "Currere" implied a "dashing chariot" or "race track." An augmentation was made by Cicero who connected the term with Curriculum Vitae that signifies "an amazing course." He likewise connected it with educational programs mentis that figuratively alludes to "the (educational) course of the brain." It was not until the nineteenth century that the term was ordinarily utilized in the instructive field.

As Curriculum is the best mean of by and large improvement of understudies. What's more, educator is arbiter among Curriculum and understudies. She/he knows different needs of understudies, instructive establishments, enterprises, guardians (partners). The nature of instructor training is kept up by Educational program of Teacher Education. The educational program improvement is dynamic procedure. The paper will managed the accompanying targets, for example, To clarify the educational program improvement process, To clarify the job of the educator as educational plan developer.3.To imparts the best rehearses with regards to curriculum improvement. The present paper will talk about the job of educators' in curriculum improvement for instructor training (Jadhav &Patankar, 2013).

The Sustainable Development Goals chosen by the United Nations incorporate an objective focused on students picking up the important information and aptitudes to advance Sustainable Development (UNESCO, 2015). The Sustainable Development Goals set out by the United Nations advocate that all students will have the learning and aptitudes expected to advance Sustainable Development. Improvement training, instruction for Sustainable Development and worldwide citizenship instruction are intentional instructive intercessions, which all location worldwide equity and supportability issues. (O'Flaherty & Liddy, 2017).

As per Wong (2003), sustainable development is viewed by numerous individuals as a fundamental bearing for the entire world to move towards. Be that as it may, he noticed that instructing for manageability was difficult consequently all specialists should endeavor to contribute towards its prosperity. Adapting to changes in the public arena and the requests for multi-disciplinary conveyance of training was difficult either. A fundamental and practice-situated methodology of the branch of knowledge was essential for the accomplishment of instruction for manageable advancement. The achievement would in any case, rely upon authority strengthening as an instrument realizing change at institutional level. There is hence, developing weight on schools to show students for Sustainable Development in creating just as created nations (UNESCO, 2005).

In what capacity can schools produce basic masterminds? What is being said to put it plainly is that the instruction, furthermore, specifically the teaching and learning as experienced in our schools and instructive foundations can't support improvement. To address the inquiry, it is significant that a basic look be taken on pedagogy, the curriculum, the student and the earth.

The National Policy on Education characterizes Technical and Vocational Education "as an exhaustive terms alluding to those parts of the instructive procedure including, notwithstanding broad training, the investigation of advancements and related sciences and the procurement of down to earth aptitudes, frames of mind, comprehension and information identifying with occupations in different areas of monetary and public activity". In this way, any instruction that is equipped towards showing specialized abilities and demeanors reasonable to such aptitudes can be viewed as specialized training. All inclusive Basic Education (UBE) presented in 1999 by the Olusegun Obasanjo organization was conceptualized to give more noteworthy access to quality, fundamental training in Nigeria. It was implied absolutely as a program of government to catch school age kids that were not intrigued by the proper training framework, and made it compulsory for the kids to encounter nine years of continuous essential and junior optional school instruction. (Adejuyigbe & Adejuyigbe, 2016).

Jacques Delors (1996) perceives four columns for training of 21st Century: figuring out how to know, figuring out how to do, figuring out how to be and figuring out how to live respectively. They incompletely compare with the as often as possible utilized skill fields: area capabilities, methodological abilities, individual skills and social capabilities (Erpenbeck & Rosenstil, 2003).

Educational Plan (Curriculum) Implementation

This includes helping students to obtain information and just as experience. Note that educational program execution can't happen without the student (COL, 2000). The student is the focal figure in the educational plan usage process. Execution happens as the student experiences the proposed encounters, information, abilities, thoughts and mentalities that are planned for empowering him/her to work viably in the public eye. Nonetheless, executing TVET Curriculum isn't free from difficulties.

DIFFICULTIES IN IMPLEMENTING THE TVET CURRICULUM IN NIGERIAN COLLEGES

The difficulties of executing the TVET CURRICULUM in Nigerian schools are synonymous with the issues of TVET in Nigeria and furthermore that of general training in Nigeria (Egwu, 2009), set that a portion of the real difficulties of the Nigerian college framework incorporates;

1. Establishment related factor, for example, shaky scholarly schedule, insufficient joint effort between tertiary foundations and sorted out private division, lacking and out of date framework and hardware, for instance poor prepared TVET workshop and libraries, flimsy study hall squares, and powerless help structure for understudies Industrial Work Experience Scheme (SIWES).

2. Human asset related issues, for example, cerebrum channel, human capital flight, ugly states of administration for instructors, and staff deficiencies crosswise over load up.

3. Government related difficulties, for example, deficient subsidizing of tertiary establishments.

4. Understudy related difficulties, for example, cultism, assessment negligence, social and scholastic indecencies (Egwu, 2009).

In any case, Udoka (2010) opined that the significant test is financing. In a similar vein, Yusuf and Soyemi (2012) placed that lacking financing is one of the issues of actualizing TVET CURRICULUM in TVET establishments. Besides, Okoroafor (2010) likewise noticed that; a portion of the issues of executing TVET CURRICULUM incorporate;

1. Absence of sponsorship: Managers of instructive organizations think that its hard to support the TVET speakers to classes, meetings, and short courses asserting that there is absence of reserve. This has influenced the rate at which the TVET teachers are redesigned.

2. Insufficient framework: TVET instructors don't have the chance to act what they have realized into training because of absence of foundation.

3. Insufficient Timing: Time ought to be accommodated TVET instructors to proceed to overhaul themselves. Remaining task at hand ought not be requesting to such an extent that they block TVET instructors structure research and time to grow new aptitudes, capacities and information through research and advancement.

4. Absence of remuneration for greatness.

Nonetheless, Nwogu and Nwanoruo (2011), Olaitan (1994) in Odu (2011), and Okebukola (2012), expressed that the difficulties of TVET are various, which incorporate lacking human and material assets regarding quality and amount; poor subsidizing of TVET, deficiencies in infrastructural offices; poor quality planning of exercise by TVET instructors; and social indecencies. As per Mohammed (2005) in Ayonmike (2013), one of the issues of Technical and\ Vocational Education in Nigeria is the absence of persuaded educators and the explanation behind this absence of inspiration could undoubtedly be followed to the low regard of the instructors. All the more along these lines, Onjewu (n.d.) set that the absence of assets then again influences different fundamentals required in the usage of specialized training like the arrangement of teaching aids, outfitting of workplaces, research centers, workshops and even essential frameworks like study hall, seats and tables, with the goal that a typical sight to discover understudies of design for example sharing a table where each in a perfect world ought to have one on account of the specialized idea of their course.

Ekpenyong (2011) in Ayonmike (2013) placed that, there are various variables, which have in different extents hindered the smooth usage of the objectives and goals of TVET. As per the National Board For Technical Education (NBTE, 2011), the underlining difficulties of TVET segment incorporate; low cultural acknowledgment, which mean low enrolment and insufficient gifted workforce, old instructional office, deficient financing, poor staffing, poor linkages with industry and general inadequacy in quality. Moreover, assessment altogether areas of training will in general be by regular assessments, which for the most part don't factor in commonsense systems in the business.

Concept of TVET

The term Technical and Vocational Education and Training is a conjoined term comprised of Technical Education (TE) and Vocational Education (VE). It is part of Nigerian instructive framework that gives space to professional preparing, ability obtaining and sufficient logical fitness. Many even in the scholarly world have attempted to characterize this arrangement of instruction under the pennant: professional training, specialized instruction, professional and specialized instruction, specialized and professional instruction and preparing. In his endeavors that draw a division, Moustafa (2010) hypothesize that, numerous instructors scarcely separate between the terms Technical and Vocational Education while society has been persuaded that Vocational Education is for the individuals who are unequipped for seeking after specialized scholarly programs. Against this foundation, Technical and Vocational Education has gained moderate ground from it's soonest times to date in the created nations (Nwosu & Micah, 2017).

Points of Technical and Vocational Education and Training

The Nigerian National Policy on Education diagram the objectives of TVET as pursues:

I. To give prepared man – control in applied sciences, innovation and business.
ii. To give specialized information and professional ability essential for financial improvement
iii. To give preparing and bestow fundamental aptitude for independence monetarily

From the above plot objectives, it is certain that the embodiment of TVE is to serve basically a vehicle for accomplishing financial advancement and thriving in a Nation through monetary liberation of individual populace. The National Economic Development is harmonious to the degree of Citizenship Economic Development and Contribution (CEDC).

Extent of Technical And Vocational Education Training (TVET)

Segments of TVE are imbedded into the Nigerian instructive framework. From the essential, post – fundamental and tertiary level accentuation are that the framework ought to have instruments for aptitude advancement, demeanor of profitability for independence and national improvement. In the fundamental instructive levels that length from elementary school to junior optional school, there are prevocational subjects educated to understudy to make mindfulness. (Nwosu & Micah, 2017).

Methodologies for Improving Program Implementation

Osam (2013) in his investigation uncovered that there are various open doors around which partners should assemble to all the more likely execute professional and specialized instruction programs in Rivers State as his contextual analysis. In light of the discoveries of the investigation, the compelling execution of VOCATIONAL AND TECHNICAL EDUCATION projects is just conceivable when schools are improved through the enrollment of excellent staff and gave exceptional hardware and offices. The creation of profoundly prepared professional and specialized school graduates will propel national advancement through a genuinely necessary talented workforce spread over the various segments of the economy. This is just conceivable, notwithstanding, with the arrangement of the correct gear and offices, thusly, affected by the accessibility of assets. Both specialized educators and principals in this examination concurred on the significance of value instructing and satisfactory offices/hardware to the usage of Vocational and Technical Education programs in Nigeria.

Specialized and Vocational Education and Training (TVET) For Sustainable Development

TVET impacts straightforwardly the universe of work and can help improve the salaries of neediness stricken natives, furnish them with more decisions in their lives and help enable people who some way or another might have been underestimated in the public eye.

TVET in the past has been viewed as 'below average training' contrasted with general scholastic instruction. TVET is presently observed as the ace key to destitution easing and social attachment and a possibility for nations to participate in the association of advancement and globalization (UNESCO, 2005). The UNESCO Bonn Declaration on Learning for Work, Citizenship and Sustainability (2004) expressed that "since instruction is viewed as the way to successful advancement procedures, Technical and Vocational Education and Training (TVET) at that point must be the ace key that can reduce destitution, advance harmony, preserve the earth, improve the personal satisfaction for all and help accomplish Sustainable Development".

TVET has persistently improved the nature of human capital and has given the important information and abilities for the advancement of one's capacities towards the accomplishment of national intensity and SUSTAINABLE DEVELOPMENT. TVET is additionally viewed as an essential instrument for improving work portability, versatility and profitability, therefore adding to upgrading a country's aggressiveness and tending to work showcase uneven characters. Nigeria's Vision 2020 is a national improvement plan tied down on the recently re-imagined advancement idea of 'Maintainable DEVELOPMENT' by the three columns: the monetary, social and political on an establishment that targets changing Nigeria into recently industrialized outskirts, "center pay nation giving an exceptionally quality life to all residents continuously 2020" (Kerre, 2010). What is required along these lines, is a workforce with the fundamental mechanical capabilities and the ability to accommodate their needs and requirements for a quality way of life and this must be accomplished through TVET organizations which are all around prepared (Kerre, 2010).

National Sustainable Development Strategies (NSDS)

As per the United Nations Department of Economic and Social Affairs (UNDESA) (2002), National Sustainable Development Strategy (NSDS) can be characterized as "an organized, participatory and iterative procedure of musings and activities to accomplish monetary, ecological and social destinations in a decent and integrative way." Five rules that recognize a NSDS have been determined: (1) nation proprietorship and responsibility; (2) coordinated financial, social and natural approach crosswise over areas, regions and ages; (3) expansive cooperation and successful organizations; (4) improvement of the vital limit and empowering condition; and (5) center around results and methods for usage. Association for Economic Co-Operation and Development (OECD) (2006) affirms that the reasonable advancement system procedure offers a chance to expand on the complementarities of projects in the monetary, natural and social circles to improve the long haul adequacy of government approach plans TVET as a veritable instrument for National Sustainable Development.

For the objectives of reasonable improvement to be accomplishes there must be an instructive program whose objectives are coordinated toward the accomplishment of financial development of the residents, ability procurement and strengthening influences. The arrangement of instruction in Nigeria as prior express that gives preparing to expertise securing, financial improvement, and liberation of residents from destitution is Technical and Vocational Education (TVE). From its objectives and destinations, TVE is a veritable apparatus to accomplish economical advancement not just at a national level in any case, internationally. This is on the grounds that the objectives of Sustainable Development and that of TVE place accentuation on monetary development and improvement of people, which will in the long run lead towards the advancement of humankind when all is said in done. Kehinde and Adewuyi (2015) accept that Vocational and Technical Education has been indispensable piece of national advancement methodologies in numerous social orders as a result of the effect on human asset improvement, profitability and monetary advancement. It holds the way to national improvement of generally countries. In a similar vein, Vijay (2017) states that, Technical Education is instrumental in making the noteworthy commitment to financial development of the Developing Countries by method for reasonable labor generation as indicated by the necessities of the Industry, Society and the Global World all in all.

Recommendations

It is prescribed that:

1. The school curriculum ought to incorporate Technical and Vocational Education into the standard general curriculum in the early types of learning for example youth and essential level. At optional level, accentuation ought to be on direction and investigation of innovative professions while at post auxiliary, accentuation ought to be on specialization with respect for advanced education and preparing for those eager and having the ability to do as such. Social mindfulness ought to be accentuated.

2. The curriculum ought to likewise be altered to meet the necessities of Vision 2020, which sets that there ought to be creation, reception, adjustment and use of information with the goal that it turns out to be a piece of formal guidance according to Vision 2020.

3. A new motivation structure ought to be created to help Science Technology And Innovation (STI).

4. Education and preparing ought to be made receptive to the changing needs of the globalized economy and there ought to be a broadened access to instruction and preparing as this will diminish social and economic imbalance. Those focuses which train the skilled and talented students ought to likewise be subsidized.

5. There ought to be harmonization among the services of instruction, preparing and expertise advancement; proper profession direction, assets for TVET and devices and hardware which fulfill industry guidelines.

6. Positive frame of mind towards TVET can be accomplished through ideal approach and authoritative condition. The legislature ought to distribute more cash to TVET

establishments and the machines utilized ought to be important to those in genuine work environment.

7. The aptitudes offered ought to be down to earth dependent on interest and not supply driven and the student allowed to be imaginative, this is on the grounds that in tests they are given an attracting paper to recreate a motor as opposed to being given incoherent parts and permitted to be inventive and concocted whatever they diminish fit. The preparation ought not really be for nearby conditions nor be founded on neighborhood practice codes.

Conclusion

On the off chance that the center level universities keep on offering TVET courses by producing graduates who have hands on abilities, at that point these schools will have cut themselves a specialty and subsequently stay above water and a wellspring of upper hand. Deep rooted learning is a self-propelled and intentional quest for information for expert or individual reasons; it happens all through life and much of the time. It improves social, citizenship, self-awareness, intensity and employability thus ought to be underlined at all degrees of learning.

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EVALUATION OF THE IMPLEMENTATION OF TECHNICAL EDUCATION CURRICULUM IN TECHNICAL SCHOOLS IN NIGER STATE

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Abstract

This study was conducted to evaluate the implementation of the technical education curriculum in technical schools in Niger State. Out of the seventechnical schools in Niger State,four (4) technical schools was selected for the study. Using proportionate stratified random sampling techniques, 36 technical education teachers in technical schools zone were selected. Structure Systematic Observation Schedule (SSOS) and Technical Education Evaluation Questionnaire (TEEQ) were used for data collection. Data collection comprised of 11 teachers used for observation while 25 teachers were given questionnaires. Therefore, a total of 25 teachers formed the sample of the study. The reliability of the instruments were established by using Cronbach Alpha. The observation made were used to calculate the reliability coefficient. A reliability coefficient of 0.92 was established. This shows that the instruments are reliable. The researchers secured the services of three research assistants and they were trained by the researchers on how to distribute and collect the questionnaire. Statistical mean and standard deviation were used to answer the research. The data were analysed using mean as standard deviation to find out the responses of technical education teachers. Results from the study showed that Technical education teachers employ discussion, discovery, problem-solving, inquiry and expository method while teaching. The teachers employed the students' activities in the curriculum, geared towards critical reflective thinking that is learner based while most students have many other things to do, either in the school or outside the school which cause them to get easily distracted from their school work. Based on the findings, recommendations were made which include that government should organize workshops and seminars to re-train teachers in proper implementation of the technical education curriculum in Technical Schools and that technical education teachers should endeavor to use learner centered strategies like

students activities in teaching and learning so that students will contribute in the process and thus make learning more concrete.

Keywords: Technical Education, Evaluation, Curriculum, Implementation and Teaching Method

Introduction

Education as an instrument of change seeks to change the environment through the thoughts of human beings and events in the environment. It is a process by which the individual is enabled to develop his knowledge, skills, values and attitudes both for his own benefit and for the benefit of the society. The process by which every society attempts to preserve and upgrade the accumulated knowledge, skills and attitudes in its cultural setting and heritage in order to foster continuously the well-being of mankind and guarantee its survival against the unpredictable at times hostile and destructible elements and forces of man and nature. (Dereje, 2013).

Education can be considered as a major tool for the systematic and sustainable human and material development of nations. It is a priority sector in every well-meaning society. It can be considered as a process of acquiring knowledge, skills, attitudes, interests, abilities, competencies and the cultural norms of a society by transmitting it to the coming generations so as to enhance perpetual development of the society. To actualize the above mentioned educational benefits, curriculum is developed for every school subjects in various educational levels. Recognizing the role of teachers in the implementation of any educational policy, Knight (2015) observed that education may unlock the door to modernization but it is the teacher who holds the key. It is the teacher who determines what happens in the classrooms especially in the technical education classroom. Successful implementation of any educational programme can only be assured through teachers who have acquired necessary competencies in terms of knowledge, skills, values and attitudes.

Curriculum implementation is the stage of presentation of a combination of the combination of the curriculum content and topics, methodology and instructional materials by the teachers to the learners, most of the time in a classroom setting, a subject or combinations that will enable them take up such learning that the teacher wants to pass across to them. In the light of a given topic, the teacher adopts the appropriate teaching methods and materials to guide student's learning. The students on their own are actively involved in the process of interaction with learning activities. (Chyung*et al.*, 2016). It is not restricted to sheer translation of curriculum proposal or decision into practice. It involves a complex of activities, materials, personnel and other factors which when approximately harnessed constitute integral parts of curriculum implementation. These include the schools which are the major implementation theatre, the teachers, curriculum materials, students, teacher training institutions, administrative and political factors, examination bodies the public, place of implementation in the curriculum planning process before curriculum evaluation or community members,.

Technical education curriculum implementation, therefore refers to a process in technical education curriculum engineering concerned with instilling life into a dormant or inert technical education curriculum plans or document, in the sense of operational objectives.

Curriculum implementation as used in this study is the transmission of planned technical education curriculum into operational curriculum in the classroom. It is at this stage that all the relevant curriculum inputs are brought into direct contact with the target audience in such a way that through a variety of activities, and learning experiences, mastery of technical education subject matter can be maximally achieved at minimal cost. Curriculum implementation occupies a strategic position in teaching and learning technical education curriculum as it link the design with evaluation stages, that is the materials and methods are put together to produce the desirable learning outcome.

Walker (2003) defined curriculum as a complex network of physical, social and intellectual conditions that shapes and reinforce the behaviour of individual's perception and interpretations of the environment in order to reinforce the learning objectives and to facilitate the evaluation. If the curriculum is not implemented, all efforts expended in the planning are in vain. Curriculum implementation refers to the actual use of curriculum plan or document in the classroom. That is putting the curriculum in use.

Learn4Work (2012), identified problems encountered in the implementation of Technical Schools technical education curriculum like non availability and use of instructional materials, inadequate qualification of teachers, non-use of appropriate methods among others as factors militating against the effective teaching of technical education at this level. The major problems remain as how the teacher could be groomed not only to teach the content but also to use appropriate behaviour of reinforcement to put his subject matter across to the students. Other problems affecting the effective teaching and learning of technical education include: poor attitude of the public towards the subject, restriction of the subject at the basic education level, threat of disarticulation, lack of career prospect of the subject, poor evaluation of the implementation of the technical education curriculum.

Statement of the Problem

The roles that technical education play in Nigerian educational system and society, its curriculum deserves to be adequately implemented in terms of methods and instructional materials. Again, the performance of students in technical education examination is not encouraging, thus warranting the central problem, which this study seeks to address. What are the reasons for this? Could it be poor attitude to the subject, poor teaching methods, inadequacy of instructional materials and defective evaluation/ assessment?

Purpose of the Study

The main purpose of the study is to evaluate the implementation of the technical education curriculum in Technical Schools in Niger State. Specifically this study seeks to determine;

vii. Identify the methods of teaching technical education in technical schools in Niger State
viii. Assess the extent of utilizing students activities

Research Questions

The following research questions guided the study:

1. What are the methods used by teachers to implement the technical education curriculum?
2. To what extent do teachers utilize the students' activities as stipulated in the curriculum?

Methodology

The design of the study is survey research design. The study was carried out in Niger State of Nigeria. All Teachers of Technical Schools in the Seven Educational Zones in Niger State. There are 7 technical Schools and 186 technical education teachers in the seven educational zones. A proportionate stratified simple random sampling technique was adopted in the selection of the sample. A total of schools were used and 36technical education teachers were drawn from the schools. The 4 schools were randomly selected on the average of nine (9) teacher from each school. Two instruments were used for the study. They are structured systematic observation schedule details and technical education evaluation questionnaire.

The technical education lesson observation schedule and technical education evaluation questionnaire for teachers were face validated by experts. Two from the Department of Science Education and one expert in Industrial and Technology Education, all from Federal University of Technology, Minna. These experts were requested to examine the list of items and indicate whether the items were clearly worded, comprehensive and applicable to the investigation. They were also asked to add or remove any item that is not necessary. The comments made by validates were used to moderate the instruments before final production.

The reliability of the instruments were established by using Cronbach Alpha. The observation made were used to calculate the reliability coefficient. A reliability coefficient of 0.92 was established. This shows that the instruments are reliable. The researchers secured the services of three research assistants and they were trained by the researchers on how to distribute and collect the questionnaire. Statistical mean and standard deviation were used to answer the research questions.

Results

Research Question 1: What are the methods used by teachers to implement the technical education curriculum?

Table 1: Mean and standard deviation on teachers' response on the methods they use.

S/n	Item Statement	Mean	Std. dev	Decision
1	Lecture method	3.61	.57	Agree
2	Discussion method	3.68	.38	Agree
3	Problem solving method	3.40	.50	Agree
4	Discovery method	3.42	.49	Agree
5	Inquiry method	3.69	.28	Agree
6	Expository method	3.01	.36	Agree
7	Teachers dictate notes to students	2.42	.48	Disagree
8	Text book reading by students	3.62	.47	Agree

Table 1: Reveals that discussion method, problem solving method, discovery method inquiry method, all scored above 2.5 bench mark, it implies that those items represent the various methods used by teachers to implement the technical education curriculum. A standard

deviation of .48for expository method shows that there was a large variation in the responses of teachers to that item.

Research Question 2: to what extent teachers utilize the students' activities as stipulated in the curriculum.

Table 2: to what extent teachers utilize the students' activities as stipulated in the curriculum.

S/N	Item Statement	VHE	HE	LE	VLE
1	Role playing	-	-	2.38	-
2	Simulation	-	3.41	-	-
3	Debates	3.36	-	-	-
4	Discussion of tasks in small groups/panel/brainstorming	3.98	-	-	-
5	Dramatization	-	3.41	-	-
6	Cultural display	-	-	2.91	-
7	Field trip/Excursions	-	3.46	-	-

The data in table 2 showed that teachers utilize the students' activities which include Simulation, Debates, Discussion of tasks in small groups/panel/brainstorming. It implies that simulation, dramatization and filed trip/excursions are being utilized by teachers to a high extent, debates and discursion of parts in small groups/panels/brainstorming are being utilized by teachers to a very high extent while role playing and cultural display are being utilized by teachers to a low extent.

Discussion of Findings

On the methods used by teachers to implement technical education curriculum, findings revealed that the technical education teachers use various methods to implement the technical education curriculum in the classroom learning environment. They employ discussion, discovery, problem solving, inquiry and expository method, which when appropriately utilized inculcate the desired reflective, critical thinking and problem solving skills to the learner.

According to Ojimba (2012), a wide spectrum of methods are best for use in teaching technical education, as the choice of many apt teaching methods would not only accommodate the varying needs, interest and background of the learners, but also take cognizance of the essential criteria for selecting technical education teaching methods which include relevance to the needs of the society, the individual learner and the objectives of the programme.

In line with research question 2, on the extent teachers utilize the students' activities as stipulated in the curriculum like role playing, simulation, debates, dramatization, cultural display, field trip, the study revealed that technical education teachers utilized students activities as stipulated in the curriculum. Since technical education deals with the teachers employed the students' activities in the curriculum, geared towards critical reflective thinking that is learner based. Some of these activities includes Debates, Role playing, simulation, Dramatization and Cultural display. This agrees with the opinion of (May &Ajayi, 2009), which states that the technical education teacher should not forget that in technical education classroom, the students learns through what he does, not through what he sees the teacher doing. Good teachers minimize teacher talk, while maximizing learning participation. Bad teachers, on the other hand, dominate the class, doing most of the talking.

It was found out that there are lots of problems in teaching technical education but the highest was the students general unwillingness to learn. It is sad to note that many students waste much of their time on other activities to the detriment of their studies, Nworlu-Elechi (2013) observed that most students have many other things to do, either in the school or outside the school which cause them to get easily distracted from their school work. Some parents pay through their nose to get their children educated. Some of these students do not realize the efforts of their parents. Worst still, some of them join secret societies losing sight entirely of their mission of going to school. Momo (2012) notes that: some of these students join secret societies and go to the extent of killing other students for rituals. Most of these students have lost interest in going to school; they become maladjusted that they finally drop out of school.

Conclusion

Based on the findings of the study, the following conclusions were drawn:

4. Teachers use various methods to implement the technical education curriculum in the classroom learning environment. The methods includes discussion, discovery, problem solving, inquiry and expository method.
5. The technical education teachers utilize students activities as stipulated in the curriculum. They are role playing, simulation, debate, dramatization, cultural display and field trip.
6. There are lots of problems of teaching technical education but the highest is the students general unwillingness to learn.

Educational Implication

The educational implications of the findings are that;

i. Since effective/proper implementation of the technical education curriculum promotes learning, enhance student-student interaction, boosts self esteem in students and promotes personal interdependence, poor implementation of the technical education curriculum by teachers will not allow the student benefit from the subject.
ii. Also poor implementation of teaching methods by technical education teachers can mar the essence of learning, which is to make learning more interactive and more effective for better academic performance.

Recommendations

From the findings, the following recommendations are made;

7) That technical education teachers should endeavour to be learner-centered when teaching and use learner centered strategies in teaching and learning, so that students will contribute in the process and make learning more concrete.

8) Curriculum planners should emphasis more on the use of interactive method of instruction like student activities (role playing, simulation, debates, field trips and

dramatization), which will not only make the teacher's work easier but also boost students performance.

9) The ministry of education should organize workshops and seminars to re-train teachers on the proper implementation of technical education curriculum in Technical Schools.

10) The school administration should make instructional materials available to make learning easier and also invite resource persons that can help educate teachers on the procedures and uses of those materials.

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THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY-BASED CURRICULUM IN THE REALIZATION OF THE OBJECTIVES OF VOCATIONAL AND TECHNICAL EDUCATION PROGRAMME IN NIGERIA TERTIARY INSTITUTIONS

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Abstract
The objectives of vocational and technical education programme in Nigeria tertiary institutions cannot be realized effectively without the utilization of Information and Communication Technology-based curriculum because ICT is a major enabler of globalization which facilitates worldwide flows of information, capital, ideas, people, and products. If the objectives of vocational and technical education programme in tertiary institutions are to be attained in Nigeria, governments, National Universities Commission, private sector and other stake holders must make great effort to solve the problems militating against the utilization and progress of ICTs in Nigeria vocational and technical education programme. This paper examines the relevance of ICTs and the vital role it can play in the realization of the objectives of vocational and technical education programme in Nigeria tertiary institutions. It also identified the challenges to ICT utilization in Nigeria and further emphasizes the need for Nigerians to embrace ICT production, training and retraining of Nigerians to be ICT experts so as to contribute and benefit immensely from the global village and the world economy which is a necessity for attaining the objectives of vocational and technical education programme in Nigeria tertiary institutions.

Introduction

In today's complex and fast changing world, Information and Communication Technology (ICT) is an indispensable tool for achieving sustainable national development. This is because the development of any nation is usually measured by the degree and extent of the socio cultural, socioeconomic and political improvement that are brought to bear through the activities of Information and Communication Technologies (ICTs).It is the extent of utilization of (ICTs) in a nation that defines a nation as developed or underdeveloped. Margaret (2005) defined Information and Communication Technology (ICT) or Information Technology (IT) as an umbrella term that includes any communication device or application encompassing: radio, television, cellular phones, computers and network hardware and software, satellite systems as well as the various services and applications associated with them, such as video conferencing and distance learning. Information and Communication Technology was also defined by Nwabueze and Ozioko (2011) as a broad based technology (including its methods, management and applications) that supports the creation, storage, manipulation and communication of information.

Information and communications technologies (ICTs) cuts across a variety of technologies including: computer, microelectronics and related technologies including microchip and microprocessor-based technologies; multimedia and other information processing technologies and systems; telecommunications technologies and infrastructure (fixed line, wireless, satellite based and mobile infrastructure); and communication network technologies and infrastructure (including local and wide area communications and computer networks for voice, data and video).Other technologies that forms part of ICTs include: broadcasting networks and technologies including radio and TV networks; production-based technologies including those used in computer-integrated manufacturing and production systems and operations, robotics technologies, biotechnology-related equipments and systems; and the internet as a globally-based delivery platform - incorporating elements of computers, telecommunications, communications technologies and networks and other multimedia development and delivery technologies to formal integrated multimedia transmission and communication delivery infrastructure and platform with a global reach (World Development Report,2009).

The revolutionary potentials of ICT lie in their capacities to instantaneously connect vast networks of individuals and organizations across great geographic distances at very little cost. As such ICTs have been key enabler of globalization, facilitating world wide flows of information, capital, ideas, people and products. They have transformed business, market, and organizations, revolutionized learning and knowledge sharing, empowered citizens and communities and created significant socio-economic growth in many countries. There is no doubt that ICT has found its niche in every sphere of Nigeria polity. The ICT industry according to Nworgu (2007) appears to be making significant in road into the Nigeria society but public awareness of ICT and its application was low due to the factor of "digital divide" prevalence in Nigeria and other developing countries.

The concept of digital divide is the disparities in the availability and utilization of ICTs between people living in different parts of the world due to their level of technological development. The digital divide, a disparity in access to ICTs between countries and communities is caused by many factors such as: inadequate infrastructure, high cost of access, inappropriate or weak policy regimes, inefficiency in the provision of telecommunication network, language divides (language differences), poor economy and lack of locally created content (Mutula, 2004). The digital divide is a disadvantage and reduces access rate at which Nigerians and other developing nations can contribute and benefits from the information age and global communities.

This was buttressed by Al-saadi, (2006) who lamented bitterly on the over dependent of Nigeria and other developing countries on ICT consumption instead of ICT production which consequently keeps them in perpetual bondage of underdevelopment and poverty. Al-saadi broadly divided ICT into two components namely. ICT production and ICT consumption. According to him ICT production is the creation of hardware and software components of ICT, provision of ICT infrastructure, ICT consultants and trainers, web designers, internet service providers (ISPs) and Data Service Providers (DSPs), while ICT consumption is the use of ICT amenities in applications like e-learning, e-medical, e-commerce, e-government, e-environment among others.
It is obvious that ICT has come to stay because it is the hub and bedrock for global and national development in the 21st century. It is a paramount and indispensible tool for global recognition and accomplishment in research and teaching in institutions of learning at all levels of schooling. It is the king pin for Research and Development (R &D) activities in industries to improve productivity and industrialization. The relevance of ICT to the development of Nigeria nationally and globally cannot be underestimated. It is on the basis of this premises that it

becomes necessary to examine the role of information and communication technology-based curriculum in the realization of the objectives of Vocational and Technical Education (VTE) programme in Nigeria tertiary institutions.

Overview of Vocational and Technical Education Programme in Tertiary Institutions.
Vocational and Technical Education (VTE) programme is a programme designed to train Vocational and Technical teachers to teach effectively in all aspects of Technical Vocational Education and Training (TVET) institutions as well as to function effectively as skilled technicians in the industries in specific occupational areas. The National Policy on Education (FRN, 2013) described TVET as a comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. Specifically the National Policy on Education (FRN, 2013) stated that the goals of TVET shall be to: provide trained manpower in the applied sciences, technology and business particularly at craft, advanced craft and technical level; provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development; and give training and impart the necessary skills to individuals who shall be self-reliant economically.

In Nigeria school system, the TVET teachers and instructors are basically trained through the Vocational and Technical Education programme.The aim of establishing Vocational and Technical Education(VTE) programme is to train individuals to equip them with teaching skills and technical skills in specific occupational area of specialization to enable them function effectively as Vocational and Technical teachers at TVET institutions (technical colleges, vocational schools, training centers among others) as well as skilled technical personnel in industries or in specific occupational areas. The major objective of Vocational and Technical Education(VTE) programme is to produce qualified skilled technical teachers to enhance implementation of effective TVET programmes in Nigeria. The graduatesof VTE programme is also trained on how to teach Basic Science and Technology (formerly Introductory Technology) at the junior secondary school level as well as other vocational and pre-vocational subjects at secondary school level.

In Federal University of Technology Minna, the specific occupational area of specialization covered by Vocational and Technical Education programme include: Automobile Technology, Building Technology, Electrical / Electronics Technology, Metalwork Technology as well as Woodwork Technology. In some other tertiary institutions, the VTE programme is called different names such as Industrial and Technology Education, Vocational Teacher Education Industrial Technical Education or Technology Education. Despite the changes in nomenclature from one higher institution to the other, the basic objectives of the programme remain the same in Nigerian tertiary institutions.

For instance at the Federal University of Technology Minna, Vocational and Technical Education programme is called Industrial and Technology Education (ITE). The specific objectives of the programme according to ITE Departmental Handbook (2019) are to:

1. Develop a department of repute for training graduate and postgraduate students that are employable, enterprising and self-reliant.
2. Equip students with appropriate techniques to solve problems affecting Industrial and Technology Education and Technological innovations.
3. Provide specialized training for technical teachers, curriculum developers and supervisors of technology education at all school levels.

4. Enable students acquire additional professional knowledge, skills and experience so as to be able to relate to others meaningfully.
5. Acquaint students with creative teaching strategies at the elementary, secondary and tertiary levels of education.
6. Contribute meaningfully to the multidisciplinary nature of Industrial and Technology Education.
7. Equip students with design and research skills.
8. Vigorously promote quality consultancy for excellent service delivery and generate funds.
9. Encourage staff and students of the department to be ICT compliant and for the programme to be ICT driven.

Achieving the laudable objectives of Vocational and Technical Education programmein Nigeria tertiary institutions, demand the use of Information and Communication Technology-based curriculum. This is because the ICT-based curriculum increases access to technical information and skill requirements needed for sustainable development and self reliance in the 21st century place of work.

Overview of ICT -Based Curriculum in Vocational and Technical Education Programme

Curriculum can be described as the totality of all the learning experiences which learners are exposed to under the guidance of the school. Drake and Burns (2004) described curriculum as the planned programme content to be delivered to the student under the guidance of the school to enhance achievement of educational goals. In the present dynamic society where change is inevitable, curriculum also encompasses all the unplanned learning experiences which learners are exposed to in a training institution.

Information and Communication Technology (ICT)-based curriculum is a new type of curriculum that emanated from developments in technology. The ICT-based curriculum is an ICT driven curriculum that organizes learning experiences into structured forms that increases learners access to curriculum content through various computer-based technologies and internet enhancement to learning experiences, learning materials as well as computer-based assessment tasks that foster effective knowledge and skill acquisition. The ICT-based curriculum is learner-cantered and eliminates too much burden placed on the teacher to initiate teaching and learning process.

The ICT-based curriculum gives a definite focus to the educational process in the school system. It shows that school life is a continuation of learning experiences both within and outside the vicinity of the institution. The common types of curriculum among others include subject centered curriculum, learner-centered curriculum, hidden curriculum and core-curriculum (Atsumbe, 2010). The federal government of Nigeria in realization of the relevance of curriculum to qualitative teacher education, established the National Commission for Colleges of Education (NCCE) and the National Universities Commission (NUC) as regulatory bodies for the supervision of teacher education programmes at NCE level and at the Universities level respectively for all categories of Nigeria Certificate in Education(NCE)and Bachelors degree awarding institutions in Nigeria.

Since inception, the NCCE and NUC have been involved in a lot of activities that focus on pursuing quality assurance in teacher education programmes in Nigeria. A careful analysis of the curriculum for Vocational and Technology Education programme in Nigeria tertiary institutions shows that the curriculum is stereotyped, outdated and does not compete effectively with best practice in curriculum content and implantation in technologically advanced countries. There is a big mismatch between the current curriculum content and the demand of the labour market.

Research has revealed that the existing Vocational and Technical Education curriculum is deficient in meeting the needs of the teacher in modern society. Thus, if the Vocational and Technical Education programme is to remain relevant to the educational needs and society it is intended to serve, it must do more than it is presently doing. It must prepare teachers with knowledge and skills required to teach effectively at the different levels and areas of vocational and technical education programmes without neglecting the needs for higher education. This calls for the need to examine the role of information and communication technology-based curriculum in the realization of the objectives of Vocational and Technical Education (VTE) programme in Nigeria tertiary institutions.

The Role of ICT-Based Curriculum in the Realization of the objectives of (VTE) programme in Nigeria

In the current technological world, the realization of the objectives of (VTE) programme in Nigeria is impossible without utilizing ICT-based curriculum. Development is impossible without ICT because ICTs is a major enabler or catalyst of development in all sectors of the economy. This is evidence in the continuous innovation in ICT which has dramatically changed our way of life. A change from analog to digital, a change from uni-media to multi-media, a change from copper wire communication system to either fibre optics or wireless cellular and even the satellite systems; a change from mono-component to hybrid component of telephone, TV and computer all in one and a change from manual to robotics. All these changes are due to innovations in ICT which serves as the primary indicator of progress and technological development of any nation.

Enhancing poverty reduction: The utilization of ICTs to support the overall development of various sectors of the economy is having great positive effect for overall productivity nationally and globally in various countries. For instance the growth of the telecommunications sector in Nigeria and several number of African countries in recent years has created avenues for poverty reduction and hunger reduction through the creation of jobs for the youth in both urban and rural areas. Also the use of ICT to support farmers and agricultural research organizations has greatly lead to new innovations and production of new and improve varieties of agricultural products and also increase food production so as to reduce hunger and prevent food insecurity. The use of ICT in governance and in the private sector also facilitate internal information flows, accountability, procurement of goods and services that could positively contribute to reduction of poverty.

Enhancing Instructional Delivery: Facilitating teaching and learning through the use of ICTs has greatly help to ensure efficient instructional delivery at all level of the educational system. The use of ICTs in education creates opportunities for the physically challenge to also have access to education and training which in turn leads to the achievement of universal primary education. Utilizing ICT in education creates wider access to education and reduces physical and social barriers to education. ICT makes it possible to improve access to limited educational resources to a larger population through various forms of schooling such as e-learning, e-education and other ICT enable educational platform.

Promoting gender equality in education: For along time gender inequalities has greatly affected women and their contribution to development in Africa. Access to ICTs is for all irrespective of gender type. This reality has made many African countries to implement specific projects and initiatives targeted at the use of ICT to empower women in various sectors. Setting up multimedia communication centres for women to improve their access to ICT sutilization will go along way to promote gender equality and empower women in Nigeria. Empowering women in Nigeria can best be done by government ministry and other stake holders involve in handling women affairs.

Provision of scholarship opportunities targeted at increasing the enrolment of women in ICT related educational and training programmes in Nigerian tertiary institutions will greatly facilitate the active involvement and contribution of women in various sectors of the economy.

Disseminating health care information: Employing ICTs in disseminating health care information to the general public through health education and awareness to pregnant women and those nursing children will cover wider population and truly reduce infant mortality rates. The utilization of ICT in disseminating health care information should be targeted towards the poor and the economically vulnerable groups within the society who usually reside in rural areas where access to quality health care information is usually lacking.
Some African countries have started using various telecommunication gadgets to disseminate health care information and conduct training in rural and urban areas to bridge the health service delivery gaps between the urban and rural areas.

Utilizing ICTs in various health care training and retraining programmes in Nigeria hospitals, pre-natal and post-natal centres will contribute greatly in reducing child mortality rate in Nigeria.

Reducing maternal mortality rate: Adopting ICTs and ICT related technologies to support health education, health care delivery service and administration and e-health related issues to mothers in rural and urban areas in Nigeria will have significant effect in improving maternal health in Nigeria. The ministry of health at various levels should develop e-health initiatives that focus on promoting the use ICTs to link health professionals in rural and urban areas to each other and to reliable sources of information including by using geostationary satellites, modem-to-modem telephone links and internet. This will help to reduce maternal mortality ratio and improve maternal health in Nigeria.

Combating HIV/AIDS, malaria and other diseases: Deploying ICTs in Nigeria in the dissemination of health education in rural and urban areas will help to enlighten a lot of people on the causes and dangers of ill health and illnesses at various stages.

This effort should also impact and focus on health consciousness and awareness creation targeted at combating HIV/AIDS, malaria and other related disease as well as improving maternal health and reducing child mortality rates in Nigeria. This will also go a long way to achieve universal access to treatment for HIV/AIDS for those who need it.

Ensuring environmental sustainability: Ensuring environmental sustainability relates to a pattern of resources use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for future generations. Exploring the use of ICTs in handling environmental issues in Nigeria will help to ensure environmental sustainability and a functional e-environment. According to Clement (2010), a functional e-environment is (a) the use and promotion of ICTs as an instrument for environmental protection and the sustainable use of natural resources. (b) the initiation of actions and implementation of projects and programmes for sustainable production and consumption and the environmentally safe disposal and recycling of discarded hardware and components used in ICTs and (c) the establishment of monitory systems, using ICTs, to forecast and monitor the impact of natural and man-made disasters, particularly in developing countries, less developed countries and small economies.

Developing global partnership for development: Deployment, exploitation and active utilization of ICTs within developing countries has greatly enabled many developing countries to partner with developed countries and such collaborations through ICTs has allowed developing countries to benefit immensely and to have access to new innovations in technologies, health care, financing methods, and other special needs which helps to develop their global partnership and enhance development.

Challenges to ICT Usage Towards Achieving the objectives of Vocational and Technical Education programme in Nigeria

Below are some prevailing challenging factors in Nigeria that can limit the roles of ICTs or the extent to which ICTs can help in realization of the Vocational and Technical Education programme:

- Erratic and inadequate electric power supply.
- Poor funding and misappropriation of ICT funds.
- High cost of purchasing modern ICT facilities and devices.
- High rate of corruption, poverty and uneven distribution of public utilities.
- High cost of specialized ICT training in Nigeria.
- Inadequate ICT infrastructures and general shortage of skilled ICT human resources (ICT experts and instructors) in Nigeria.
- Poor orientation of Nigerians on the importance of ICTs to national development.
- Low access to ICT services due to the factor of "digital divide" and poor availability of ICT facilities and devices.
- Too much emphasis on ICT consumption against ICT production due to the deplorable state of ICT training institutions and ICT departments in Nigeria tertiary institutions.
- Unfriendly atmosphere in Nigeria due to terrorism, wanton bomb blast, kidnapping. Chaos, ritual killings and several other vices.

Recommendations

Based on the review above, the following suggestions were made:

5. Provision of stable and adequate electric power supply.
6. Adequate funding of ICT training institutions and ICTs related departments in tertiary institutions by the various governments, private sector and other stake holders in Nigeria.
7. Government in collaboration with the National Communication Commission (NCC) should purchase relevant ICTs facilities /devices and make them available to the masses for utilization at various ICT training centers.
8. Re-orientation of our value system and creating awareness through various media on the importance of ICTs to national technological development.
9. Strict monitoring of NCCactivities in terms of utilization of ICT funds and implementation of ICT policies in Vocational and Technical Education programme in tertiary institutions.
10. Periodic ICT policies performance review, implementation and access in tertiary institutions.

11. The government should set up powerful V-SATs and pay for adequate size of bandwidth in all ICT training institutions, federal and state tertiary institutions.
12. Ensuring a stable and friendly atmosphere to attract skilled ICT experts and instructors that can train and retrain Nigerians on ICT production.
13. Governments at various levels should lay more emphasis on ICT production rather than ICT consumption.
14. The ICT content in Nigeria educational curriculum in Vocational and Technical Education programme in tertiary institutions should be increased so that Nigerians can learn to think, love and embrace ICT.

Conclusion

For Nigeria economy to prosper and achieve the objectives of Vocational and Technical Education programme in Nigeria tertiary institutions, the challenges confronting the progress of ICTs in Nigeria must be recognized and fought vigorously by governments at all levels, the private sector and other stake holders. We must embrace ICTs and channel adequate financial resources towards ICTs production, mass training and retraining of Nigerians to be ICT literate and experts in various sectors of the economy so as to cope with global competition in the world's global village. Nigerians must be enlightened to be aware that it is ICT that defines the status of development of a nation. It is only ICTs that determines the leaders of our world and those that are perpetual followers. It is only ICTs that will make our country recognized, resilient, sustainable, competitive and diversified. Information and Communication Technology-based curriculum is a necessity for the realization of the objectives of Vocational and Technical Education programme in Nigeria tertiary institutions

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THE PROBLEMS AND PROSPECTS OF BIOLOGY EDUCATION CURRICULUM DEVELOPMENT IN NIGERIA BEYOND 2020

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Abstract
Despite all the great things biology education can accomplish in Nigeria, it's development beyond 2020 seems slim. This is due to some fundamental problems which the paper discussed under the following headings: security, corruption, teacher, lack of proper curriculum development and inadequate fund. The paper highlights the objectives of biology education and prospects of biology education development in Nigeria. Few recommendations on how to achieve biology education development in Nigeria were discussed. In conclusion, the government should support people in understanding and acting to transform the social, cultural, political and economic structures which affect their lives and the lives of others at personal, community, national and international levels. For this will help Nigeria to achieve biology education development beyond 2020. The paper focused on the problems and prospects of biology education development in Nigeria beyond 2020.

KEY WORDS: Problems Prospects, Biology Education, Curriculum Development, Nigeria, Beyond 2020

Introduction

Biology is the study of natural phenomena and environment which results from curiosity of man (Nlewem, 2005). Biology is also a branch of science which has been structured to equip the students with the knowledge of relevant concepts and scientific skills (Onyegegbu, 2002). Biology is all the knowledge of living things that has come to us from the past. It is therefore the science of life. Biology education is the act of teaching and learning in order to inculcate or transfer the knowledge of biology to the student (Okenyi, 2012). Educating people in science especially biology has been widely acknowledged as a way of promoting economic development, eliminating poverty and introducing social welfare (Nwagbo, 2005).

Development is the act of improving by expanding or enlarging or refining a situation or condition of a particular thing. (Tunde, 2011). It is a process in which something passes by degrees to a different stage. However, to develop biology education in Nigeria, the government should improve the teaching and learning of biology by providing adequate laboratory/teaching materials, qualified biology teachers, good biology classroom environment, use of good teaching methods by the biology teachers, a proper curriculum standard for teaching biology and provision of fund to the schools.

Developing countries like Nigeria, Ghana and others have made efforts to generalize the provision of biology education at both secondary and higher institution levels. The present teaching and learning in biology classroom in Nigeria seem inadequate and also the level of biology teacher competence needs to be raised to the level that will allow teachers teach students using varied instructional methods and with a focus on understanding, rather than lecture transmitting knowledge with the consequent student rote learning (Ameh, 1991).

It is therefore necessary for all teacher education programmes which aims at developing good teaching skills in biology teachers so as to enhance the development of biology education in Nigeria. Education development in biology simply means improvement in the teaching and learning of biology. It is an educational process in biology which is aimed at increasing awareness and understanding of the rapidly changing, interdependent and unequal world in which we live (Mckeowu, 2002). It is therefore necessary for the government to assist in the development of biology education so as to support people in understanding and acting to transform the social, cultural, political and economic structures which affect their lives and the lives of others at personal, community, national, and international levels.

Biology education is very important for any growing economy like that of Nigeria. About 70percent graduate of biology education are self employed and employers of labour (Okenyi, 2012). Many graduate of biology education also own schools of their own where people work and earn their living while some are into fishery business. These contributions of biology to the development of the Nigerian's economy will be highly improved through analyzing the problems and prospects of biology education in Nigeria. This paper intends to focus on the problems and prospects inherent in the achievement of biology education curriculum development in Nigeria beyond 2020. `

Concept of Biology Education

Biology as a branch of science plays a vital role in providing knowledge of relevant concepts, scientific skills, environment and natural phenomena (Nlewem, 2012). It helps to develop science process skills and scientific attitude. Education on the other hand is a designed process for training an individual by which knowledge is acquired (Eya, 2010). He opined that it is a vital developmental process which is directly related to the effectiveness of trained manpower. Biology Education is a process of imparting knowledge, skills and attitudes in biology to a learners at any level. It gives the learner a sound academic knowledge, skills and ample opportunity to apply this knowledge.

According to Okenyi (2012), Biology Education is an application of principles of education in teaching and learning of biology. It is also the act of teaching and training in order to inculcate or transfer the knowledge of biology to students.

Objectives of Biology Education

The study of biology can have a multitude of aims and objectives largely; it is studied to allow a person to enter a specific field of employment. Other aims for studying biology are intellectual, ethical and pragmatic: to increase knowledge about all types of organisms, to encourage greater benevolence in the relationship between humans and the natural environment and to implement biological skills into various technologies or management techniques (Heather, 2007). The study of biology aims to increase understanding of living systems and to allow one to consider the systems in relationship to the self and other organisms in the natural environment. Biology has many applications, in the natural environment. Studying biology however allows health care workers to understand the living systems of the body and to apply the knowledge in direct ways to recover and maintain the physical health of both animal and human patients.

The major objectives of biology education in Nigeria are
1. To provide the youth with sound knowledge of the basic principles and techniques of biology.
2. To produce knowledgeable, highly motivated, professional and effective teachers of biology who will be able to develop in students an appreciation and understanding of biological processes and principles.
3. To develop confidence in biology teachers and enhance the ability to adopt to the changing situation in science and the technological oriented society.
4. To view biology as a process of inquiry into the living world.
5. To analyze the activities of living things in their environment.
6. To demonstrate practical skills in handling scientific apparatus.
7. To demonstrate excellence and professional competence in teaching secondary school biology.
8. To include positive scientific attitudes and value in the society and promote positive disposition towards biology, science and the scientific enterprise.
9. To apply concepts and methods acquired in new areas of study and in everyday situation (minimum standard for NCE teachers, 2008).

To achieve the above listed objectives which are aimed at the development of biology education and acquisition of knowledge for an improvement in biology education in Nigeria beyond 2020, there is need to assess the problems and prospects of biology education development in Nigeria.

Problem and Prospects of Biology Education Development in Nigeria

Despite all the things biology can accomplish in the nation's development, there are many problems militating against it especially in Nigeria. These problems can be viewed under the following headings.

1. **Security**: Security issue in Nigeria has been worrisome for more than two years now because of the insurgence of the Boko Haram sector due to religious motivation. People in Nigeria live in fear of the uncertainty of death from bomb explosions or gunshots from the terrorists or from armed robbers and many a time from kidnappers. The lives of nationals living in Nigeria are in perpetual danger due to kidnapping (Aina, 2010). Lecturers and students don't know their fate every day until they retire to bed at night because of armed robbers. The recent attack on a northern university where student and lecturers were cold bloodedly murdered still remains fresh in the academic arena. Science infrastructures built with huge amounts of money for schools in which Biology departments in such schools are part of its beneficiaries were also destroyed while gas and oil installations are vandalized too. The resultant effects of these are on education. Many parents have lost their jobs and the effect is on the children. These children could not complete their education and eventually had to drop out of schools. Majority of these dropout students are very brilliant scholars who could have become renowned Biology educators the country would be proud of.

2. **Corruption**: Corruption has eaten deep into the Nigerian system and it is manifesting in every sector of education including biology. In Nigeria today it is not what you know but whom you know. Appointment and admission into higher institutions of learning are no longer based on merit but on whom you know and the amount you can offer for such job or space for admission. Purchases of biology equipment for schools are no longer done transparently since it is either the chief executive of the school or many of his or her relation will do the supply. In

this case they neither supply according to the required specification nor the required quantity. In most cases they don’t even supply anything thereby living most of the biology laboratories empty or with fake and obsolete biology equipment which are useful for nothing but for mere demonstration. Money meant for staff training are diverted to personal account while selection of those who benefit in staff training is on whom you know syndrome. All these will bounce back on the quality of biology educators Nigeria produces. Employment is also no longer based on merit; those who are qualified for teaching biology are not given employment because they don’t have godfathers in the government. Teaching appointment is done based on nepotism and favouritism. This is affecting the development of biology education in Nigeria.

3. **Teacher**: Biology teachers are key factors to be considered when talking about the development of biology education in any nation. There are shortages of qualified biology teachers in Nigerian schools, and the so called biology teachers are not professionally qualified. They may have the knowledge of the subject but lack the method. Aina, (2009) on his study of challenges and prospects of science teaching affirmed that there are unqualified science teachers in the country.

These teachers for many years have not upgraded their certificates by going for in-service training, this affects their output and it is a problem to the development of science education of which biology in one of them.

4. **Lack of Proper Curriculum Developed**: In the development of biology education in Nigeria, the relevance of biology education curricular cannot be ignored. Biology education has not been given an appropriate place in the Nigerian school curriculum. Even though, bulk of what is taught in schools is imported from other developed countries (Obiaga, 1997). It is therefore necessary to have a curriculum reform to enhance biology education development in Nigeria.

5. **Inadequate Fund:** There is no adequate fund for the provision of conducive and enabling environment to facilitate the effective teaching and learning of biology process as well as research. Tertiary institutions are statutorily expected to be engaged in research to enrich the process of social development and not to be engaged in teaching only (Ebong, 2008). These expectations are not adequately met due to inadequate funds as research in biology requires huge investments and capital which ordinary individuals cannot cope with.

The Prospects of Biology Education Development in Nigeria

The prospect of biology education development beyond 2020 is very slim. Poor governance is significantly showing progress towards biology education and undermining the quality of biology education services. Despite the problems or challenges towards the development of biology education in Nigeria, some prospects are reviewed under the following headings.

(1) Heath care and Education

Biology has many applications, both in the natural environment and the environment of health and education. Studying biology allows health care workers to understand the living systems of the body and to apply the knowledge in direct ways to recover and maintain the physical health of both annual and human patients. Biology education, if develops beyond 2020 will help the biology educators to teach the study of life to future generations.

(2) Understanding living system and critical thinking

Biology education development will help to increase understanding of living systems and to allow people to consider the system in relationship to self and other organisms in the natural environment.

(3) Employment

Biology education development in Nigeria will prepare the Nigeria for a career working in either an educational institution or an industry in which you can be directly involved in the research and development of drugs, food related items and biotechnology. Through biology education one can also become qualified to work for the government in managing an environmental research of animals, river system or biological waste. If biology education is well developed in Nigeria, people will also be able to learn many of the skills needed to succeed in business like fishery business (Augustana, 1999).

(4) Program Goals

Biology education development will provide a comprehensive education in biology that stress scientific reasoning and problem solving across the spectrum of disciplines within biology. It will enrich students with opportunities for alternative education in the area of biology through undergraduate research, internships and studying abroad.

(5) Learning aspect

Development of biology education will help the learner to be able to read, understand, and critically interpret the primary biological literature in his/her area of interest and to apply basic ethical principles to basic and applied biological/biomedical practice and will understand the role of biology/biomedical science and practitioners in society.

Conclusion

For the prospects of biology education development listed above to be met, there is need to assess the problems of biology education in Nigeria, bearing in mind the stated problems like insecurity, corruption, lack of funds, teachers altitude and method of teaching, poor curriculum standard and the recommendations made below.

Recommendations

Having assessed the problems and prospects of biology education development in Nigeria, the writer is of the opinion that such problems can resolved if the following recommendations are considered for implementation.

1. Biology education curriculum and methodology should be refocused in Nigeria. This involves reformation and restructuring of biology education in line with the ethics of production and training for self-reliance.
2. There should be a restructuring of the minds of the Nigerian youths through education for a purposeful and determined effort aimed at biology education development. Identifying the problems of Biology Education in the light of the development of biology education in Nigeria is the starting point of the restructuring process.
3. Biology students should have the ability to communicate, work in teams and adapt to changes. This is to enable the students to be innovative, creative and be familiar with the new technology.
4. Biology teaching should be adjusted to employment needs and entrepreneurship. This entails relationship with the employment market, local needs, community participation and development objectives.
5. Biology Educators should be sponsored for seminars, conferences at the appropriate times for this will motivate them.

6. Government should increase funding for the biology sector. Various agencies should donate laboratory techniques to both secondary schools and tertiary institutions offering biology as a course.
7. Biology education should be perceived as a global issue. This can be achieved by restructuring and reforming government policies, international co-operation and biology education institutions. For this is the principle for developing strategy in support of biology education beyond 2020.
8. Finally on corruption, the ongoing constitution review must be taken serious and it should stipulate a life imprisonment for any corrupt person weather in government establishment or private establishment, corruption is corruption once it is established, the individual should be sent to life imprisonment. More so, government should create more jobs. Corruption and Boko haram insurgency must be shun at everywhere they rear their heads in the country and biology teachers must be ready for a change in their methods of teaching and attitude to work.

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APPRAISAL OF E-READINESS OF NCE TECHNICAL TEACHER TRAINING INSTITUTIONS IN NORTH-EASTERN NIGERIA

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Abstract
The study was carried out to assess the e-Readiness of NCE Technical Teacher Training Institutions in North-Eastern Nigeria in terms of the availability of ICT facilities and ICT proficiency of the lecturers. Two research questions were raised and answered for the study. Eight Institutions were covered. Descriptive survey research design was adopted in which observational checklist and a structured questionnaire were used for data collection. The percentage level was used to determine the adequacy or otherwise of the facilities observed using the checklist, while, the real limit of the mean was used for the items on the questionnaire. The overall findings revealed that the Institutions have adequate ICT infrastructural facilities necessary for e-learning activities, buttheir lecturers do not possess the required proficiency on the use of basic tasks needed for ICT based activities. The study recommended that the ICT facilities at the Institutions should be upgraded, and that the lecturers should endeavor to achieve the desired competency in the use of the ICT facilities in line with the global standard.

Keywords: Competency, e-learning, e-Readiness, ICT Facilities, ICT Proficiency Level

Introduction
The objectives of the NCE programmes, in accordance with the NCCE minimum standard,among others is to make the NCE students to be able to discuss intelligently the main ideas that have affected and still affect the development and practice of education generally, andin Nigeria particularly; to professionally combine use of conventional and ICT or other innovational instructional/learning strategies in generating, and imparting knowledge, attitudes and skills at Basic Education level; to develop, select, and effectively use appropriate curriculum processes, teaching strategies, instructional materials and methods for maximum learner achievement (NCCE, 2012). Also, the Nigeria National Policy on Information Technology, revealed that the federal government of Nigeria recognizes Information Technology (IT) as a strategic imperative for national development and taking cognizance of its immense benefits, it has resolved to provide considerable national resources, both financial and otherwise for the realization of the National IT Visionstatement (NNPIT, 2001).

In Nigeria today, there is a long list of tertiary institutions amongst which are the Colleges of Education (COEs). These Colleges of Education became part of the Nigerian educational system around 1960, during the time when Nigeria gained independence from Britain. The COEs are established is to train teachers of primary and secondary school students, to give Nigerian students in primary and secondary schools the best teachers that are well rounded for the teaching profession.

"Technical and vocational education (TVE) has been an integral part of national development strategies in many societies because of its impact on productivity and economic development"(Uwaifo, 2010). This is an indication of the extent towhich TVE play an important role in nation building as being adopted by many nations as part of their national development strategic plans. ICTs help to relate academics to the practices of todays' work (Yusuf, 2012). Information and Communication Technologies (ICT) have played significant role in enhancing the pace of socio-economic development around the globe (Chouri, 2005).

In preparing the students of today to become successful individuals of tomorrow, teachers have the responsibility of structuring the student's learning activities and goals to ensure effective and up to date knowledge is passed to the students". This can only be achieved if the teachers themselves are effective and up to date in methodology and content.

According to Ifeakor & Anujeonye (2012), the introduction of e-learning has indeed revolutionized teaching and learning process at all levels of our educational system by making knowledge more accessible to all. This knowledge is highly needed in colleges of education where lecturers teach the would-be-teachers (pre-service teachers).

Statement of the Research Problem

An education system has to be suited to the demands of the technological age so that a competitive edge can be maintained. Such demand for a technology savvy workforce is reflected in Alvin Toffler's declaration (cited in Agboola, 2013), and that "the illiterate of the 21st century will not be those, who cannot read and write but those who cannot learn, unlearn, and relearn." In view of the apparentlack of proper implementation of ICTs at various levels of Nigerian education, it is important to examine the ICT facilities and utilization capacity level of Nigerian Colleges of Education (Technical) as the source of technical teachers that will teach in the Technical/Vocational Colleges and the Junior Secondary Schools.

The National Information Technology policy recognized the strategic importance of using ICT technology in education for national development, one of the challenges identified is teachers' phobia for computers(NNPIT, 2001). A roadmap for the Education Sector was designed which outlines the guidelines to address the issues, amongst which a scheme for computer literacy and acquisitionwill be established for teachers, in order to align with implementation of the compulsory computer curricula at all levels (NCCE, 2011).

Aims and Objectives of the Study

- The availabilityof ICT facilities at the NCE TechnicalTeacher Training Institutions in North-Eastern Nigeria.
- The level of ICT proficiency of the lecturers at the NCETechnical Teacher Training Institutions in North-Eastern Nigeria.

Research Questions

The following research questions were raised to guide the study;

1. What is the level of e-Readiness in terms of availability of ICT facilities at the NCE Technical Teacher Training Institutions in North-Eastern Nigeria?
2. What is the level of ICT proficiency of the lecturers at the NCE Technical Teacher Training Institutions in North-Eastern Nigeria?

Concept of e-Readiness and the Need for Teachers' ICT Proficiency

Teachers' readiness is the state of teachers being prepared, motivated and encouraged in all ramifications to take an action of implementing a planned, reviewed and renewed curriculum(Agulanna&Nwachukwu, 2011).e-Readinessis the ability to pursue value creation

opportunities facilitated by the use of the Internet. It is a known fact that the best way to solve a problem is to prevent its occurrence. To prevent the occurrence of a problem is to get the people concerned to be well informed. Being well informed means being well educated about the present situation in the environment. That was why the FRN chose education as an 'instrument par excellence' for effective national development (FRN 2001).
Egbri (2015), asserts that"e-learning is where the knowledge is delivered via electronic media (the Internet, intranets, extranets, satellite broadcast, audio/video tape, interactive TV, CD-ROM).The use of classroom computers and the Internet is often considered together broadly within the concept of e-learning.

The Provisions of NCE Curriculum

The NCE is a sub-degree but highly qualitative professional teacher education program, obtained after a three year full-time programme in a College of Education (NCCE 2011). It is therefore a more qualitative and specialized teachers' certificate than the Teachers Grade Two Certificate. This makes it imperative for the products from Colleges of Education in Nigeria to be of a very high quality when lecturers and students are made to have access to available e-learning facilities (Ifeakor & Anujeonye, 2012).

Consequently, the NCE curriculum generally aims at producing teachers with high personal and professional discipline and integrity, who are dedicated, with appropriate knowledge, skills and attitudes that would facilitate easy achievement of the Nigerian national goals.

Methodology

Descriptive survey design was adopted for this study. It was deemed necessary because the study appraised the level of e-Readiness of the NCE Technical Teacher Training Institutions in the North-Eastern Nigeria, particularly in terms of their levels of availability of ICT infrastructures and lecturers' ICT proficiency needed for ICT based academic activities. The area of the study is the six states of the North-East geopolitical zone of Nigeria. These are Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe states. There are eight NCE Technical Teacher Training Institutions duly accredited by the NCCE. The population of the study was 131 which is a manageable size, as such, no sampling was carried out. Thus, the researcher used the entire population.

Twoinstruments are used for data collection. These are a 30 itemsObservational Checklist and a15 itemsStructured Questionnaire.The Checklist solicited information on the availability, functionality and adequacy levels of ICT infrastructural facilities, tools and equipment; while the Questionnaire sought information on the levels of ICT Proficiency of the lecturers.

Results and Discussion

The data were statistically analyzed and presented in tables based on the two research questions that guided the study. In order to answer the research questions, the data were analyzed using frequency and percentage of availability and shortfalls for Research Question One, while Statistical Mean and Standard Deviation for Research Questions Two.

Findings of the Study

i. Thefindingsfromresearchquestion oneraisedonavailability of ICT infrastructural facilities, tools and equipmentshowed that 63.33% of the required facilities were found to be adequate. This indicated that the institutions are e-Ready in terms of facilities, tools and equipment.
ii. The result obtained from analysis of research question Two raised on ICT proficiency

level of the Lecturers showed that the Lecturers are less proficient in the use of ICT facilities.The finding thus, revealed that the institutions are not e-Ready in terms of ICT proficiency level of their lecturers

Summary and Conclusion

Technology and societal changes are moving the global trends rapidly towards a new socio-economic order rooted in ICT based programmes. Hence, assessing and monitoring the e-readiness of a nation has become increasingly important.Thestudy proposed a framework to evaluate the e-readiness of NCE Technical Teacher Training Institutions based on two factors: level ofICT infrastructural facilities and thelevel of lecturers' ICT proficiency for ICT based activities. In order to achieve thisobjective,twospecific purposeswereraisedand translatedinto correspondingresearchquestions. To answer theresearch questions,two different instruments were used for data collection, these are an Observational Checklist and a Structured Questionnaire that were developed based on NCCE Minimum Standards and Global e-Readiness Benchmark for Developing Nations.

Based on the results obtained, it was concluded that though, the institutions under study have adequate ICT infrastructural facilities for e-learning activities, yetthey are not e-Ready with regard totheir lecturers' level of ICT proficiency needed for ICT based academic activities.

Educational Implications of the Study

The findings would enable the administrators of the Institutions to identify their strengths and weaknesses with regard to adequacy of their ICT infrastructural facilities and extent of ICT facilities utilization which determine their ICT instructional capacity. It would alsoenable the lecturers of the Institutions to identify their levels of ICT proficiency by exposingthem to the technical competencies expected of them to enable them move with the global pace in ICT driven world. They will also be able to clearly identify the challenges ahead of them in their quest for new innovative knowledge in line with global standard.

The findingswould assist the Federal Government to be aware of the existing levelsof ICT instructional capacity and utilization in the institutions, which determine the pace at which the ICT integration policy, especially in the education sub–sector is being implemented. This would enable the Federal Government to expedite action toward fulfilling their mandate of achieving the goals of the National IT vision as enshrined in NITDA policy document.

Recommendations

The ICT facilities at the NCE Technical Teacher Training Institutions should be upgraded to meet the required standard based on the international practice. This will make the institutions to provide adequate and effective knowledge to the students to enable them compete favourably with their counterparts anywhere in the world; Also, the lecturers should endeavour to acquaint themselves with the required competency through personal efforts, and the authorities of the institutions should encourage them further by way of conferences, seminars and workshops to achieve the desired proficiency in the use of ICT facilities for academic purposes.

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