THE ROLE OF ICT IN ENHANCING INSTRUCTIONAL DELIVERY IN TERTIARY TECHNOLOGY EDUCATION PROGRAMME IN NIGERIA'S DWINDLING ECONOMY

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Abstract
The paper examined the role of Information and Communication Technology (ICT) in enhancing instructional delivery in tertiary Technology Education programme in Nigeria's dwindling economy. The paper explained the conceptual overview of a dwindling economy as well as Information and Communication Technologies. The specific role and applications of ICT in enhancing instructional delivery in technology education programmes in advanced nations were reviewed. Similarly, the global trend in the stages of specialized use of ICT in instructional delivery in education programmes was also reviewed. The guidelines for using ICT in instructional delivery in Technology Education programme were unveiled. The barriers to the utilization of ICT in Technology Education programmes in Nigeria were highlighted. It was concluded that ICT plays a vital role in enhancing instructional delivery in tertiary technology education programmes in advanced countries and can also be useful in achieving success in instructional delivery in tertiary Technology Education programmes Nigeria's dwindling economy. It was recommended among others that there should be adequate funding of Nigeria Technology Education programmes, ICT training institutions and ICTs related departments in tertiary institutions by the various governments, private sector and other stake holders.

Keywords: ICT, Instructional delivery, Technology Education, Dwindling economy

Introduction

A dwindling economy connotes an unstable economy with uncertainties in economic activities, high rate of unemployment, economic hardship and poverty. A dwindling economy can also be referred to as a recessed economy where the economy slows down, and the level of sales and production orders start declining (Onyenekenwa,2010). During economic recession, production facilities become underutilized, and companies respond by reducing the work rate. Workers who had been hired on casual basis are laid off, and this reduces their disposable income. The prospects for growth become gloom; banks increase interest rates to counter the rise in risk of default of loans. Idle capacity of production facilities reduces the output, and most companies are forced to reduce prices of products in an attempt to increase demand. Profit margins of companies' starts decreasing and the gross domestic product also start to decrease.

According to Prince and Odia (2010), the some features or characteristics that can be observed in a dwindling economy include : high unemployment rate, high level of corruption among the ruling class, fragile political environment, high inflation rate, low average real income, low saving ratio or high consumption ratio, low level of technology including local technology, low levels of productivity, low per capita income and downward trend of living, high poverty rate of a large proportion of the population, low economic growth rate, poorly developed financial and stock markets as well as high level corruption and instability and insecurity of lives and property. The economic hardship experienced in a dwindling economy has negative effects on instructional delivery by teachers in Technology Education programmes in Nigeria's' Technical and Vocational Education and Training (TVET) institutions.

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. Technology Education (TE) according to FRN (2013) was described as a tertiary level TVET programmes designed to equip individuals with required technology-based knowledge and skills in specific occupation or trade as a way of preparing students to function efficiently in the world of work upon graduation. The specific goals of Technology Education at the tertiary level according to FRN (2013) shall be to:

a) Provide courses of instruction and training in engineering, other technologies, applied science, business and management, leading to the production of trained manpower.

b) Provide the technical knowledge and skills necessary for agricultural, industrial, commercial, and economic development of Nigeria.

c) Give training and impart the necessary skills for the production of technicians, technologists and other skilled personnel who shall be enterprising and self reliant;

d) Train people who can apply scientific knowledge to solve environmental problems for the convenience of man; and

e) Give exposure on professional studies in the technologies.

Tertiary Technology Education encompasses TVET programmes offered in Universities, Polytechnics, Monotechnics and Colleges of Education (Technical) and other specialized post- secondary institutions. Achieving successful and functional Technology Education programmes in Nigerian tertiary institutions in this current era of dwindling economy demand effective instructional delivery by lecturers in the Technology Education programmes.

Instructional delivery refers to the process of teaching a lesson. Instructional delivery is a vital component of curriculum implementation which encompasses teaching methods and strategies adopted to teach a course of instruction or subject. Effective instruction delivery is most schools in advanced nations have been achieved through the application of Information and Communication Technology (ICT) in the teaching process. According to Nwabueze and Ozioko (2011), in today's complex and fast changing world, Information and Communication Technology (ICT) is an indispensable tool for achieving effective instructional delivery in schools. This according to the authors is because of the interactive nature of ICT-enhanced teaching methods as well as the ease of teaching and learning through ICT at a convenient pace. It is on the basis of these facts that the researchers deem it necessary to unveil the role of ICT in enhancing instructional delivery in tertiary Technology Education programme in Nigeria's dwindling economy.

Overview of Information and Communication Technology (ICT)

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) 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 electronic-based technologies including: computer, microelectronics, microchip and microprocessor-based technologies; multimedia, information processing technologies and telecommunication systems. and related technologies including microchip and microprocessor-based technologies; multimedia and other information processing technologies and systems as well as other instructional delivery technologies (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 worldwide 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 economy.

The ICT industry according to Nworgu (2007) appears to be making significant in road into the Nigeria society but public awareness on the capability of ICT and its application appears to be 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 instructional delivery 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 roles of ICTs in enhancing instructional delivery in tertiary technology education programme in Nigeria's dwindling economy.

The Role of ICT in Enhancing Instructional Delivery in Technology Education

Effective instructional delivery that can led to national technological development is impossible without ICT because ICTs is a major enabler or catalyst of educational technology in all levels of schooling the economy. This is evidence in the continuous innovation in ICT which has dramatically changed our way teaching a lesson. 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.

ICTs are revolutionizing Technology Education by removing distance from education and making knowledge and skills more accessible to all. ICT-enhanced instructional delivery in Technology Education (TE) will play a crucial role in the development of a lifelong learning culture and has the capacity to empower learners by providing them with multiple pathways that offer choices and channels to meet their education and training needs (Israel, 2014). It is not surprising therefore to see a growing interest in ICT enhanced-TE across the world. ICT enhanced-TE or ICT driven TE may be defined as the array of hardware and software used in the teaching and learning systems that include computer-based training systems, multimedia systems, electronic performance support systems, telecommunications systems, as well as the Internet with World Wide Web systems.

The rate at which the Internet is being accessed keeps increasing at lightning speed. ICT driven TE can enhance instructional delivery and learning in TE programmes; it has the potential to become cost-effective as it offers greater flexibility regarding time and location of training delivery (Khan , Mahbub & Clement, 2012). ICT enhanced learning in TE provides greater flexibility to adapt teaching and learning to meet learners' cognitive and learning styles.

Stages of ICT Usages for Instructional Delivery in TVET Programmes

Studies of teaching and learning in schools around the world as revealed by Khan , Mahbub and Clement (2012) identify four broad stages in the way that teachers and students learn about and gain confidence in the use of ICT. These four stages include: ICT awareness, learning how to use ICT, understanding how and when to use ICT, and specializing in the use of ICT tools.

Becoming aware of ICT: In the initial phase, teachers and learners become aware of ICT tools and their general functions and uses. In this stage, there is usually an emphasis on ICT literacy and basic skills. This stage of discovering ICT tools is linked with the emerging stage in ICT development.

Learning how to use ICT: Following on and from the first stage comes the stage of learning how to use ICT tools, and beginning to make use of them in different disciplines. This stage involves the use of general or particular applications of ICT, and is linked with the basic knowledge of the functions of various ICT components hardware and software.

Understanding how and when to use ICT: The next stage is understanding how and when to use ICT tools to achieve a particular purpose, such as in completing a given project. This stage implies the ability to recognize situations where ICT will be helpful, choosing the most appropriate tools for a particular task, and using these tools in combination to solve real problems. This stage is linked with the overall efficiency resulting from the utilization of ICT as an educational tool for instruction delivery.

Specializing in the use of ICT: The fourth and the last stage involves specializing in the use of ICT tools which occurs when one enters more deeply into the learning environment that creates and transforms the learning situation with the help of ICT. This is a new way of approaching teaching and learning situation with specialized ICT tools and is linked with the actual ICT-based available in various fields of study.

Global Trend in the Usage of ICT for Instructional Delivery

ICT driven instructional delivery have been found to be more interesting and relevant to teachers in the teaching career in enhancing instructional delivery and learning. Nunes and Gaible (2002) identified four broad stages in the way the teachers and learners use ICT as a support to teaching and learning. These four stages have been broadly classified as :supporting work performance, enhancing traditional teaching, facilitate learning using multi-modal instruction, and creating innovative environments.

Supporting Work Performance : In thi initial phase, teachers use productivity tools such as word processor, visual presentation software, spreadsheet, database, email etc. to support their daily work performance. In this initial stage, there is usually an emphasis on basic operations of electronic office software. This stage of using productivity tools for teaching and learning is linked with the emerging stage in ICT development globally.

Enhancing Teaching: Following on and from using productivity software, comes the stage of learning how to use and develop computer assisted learning software and beginning to make use of such software in different disciplines. This stage involves the technique of integrating computer-based learning in the traditional instructional process, and is linked with the applying stage in the ICT development model. Various instructional packages were selected, developed and used to enhance traditional classroom teaching.

Facilitating learning: The next stage involves using various types of instructional software to facilitate student learning. The key point is that the teachers need to learn how to choose the most appropriate tools for a particular task, and using these tools in combination to solve real life problems. This stage implies the ability to recognize situations where various multimedia, simulation and modeling software can be utilized for teaching and learning.

Creating innovative learning environments: The fourth and last stage involves specializing in the use of network based resources to create meaningful environment with rich affordable for innovative learning models so that it occurs when one enters more deeply into the shared learning environment that creates and transforms the learning situation. This is a completely new way of approaching teaching and learning using technology. It helps to develop, deliver and manage open and flexible learning program.

Classification of ICT by Functions in Technology Education.

ICT was classified by function according Kafka (2013) into four stages. Kafla ()2013 described the following functions of the use of ICT in education: (a) ICT as Object (b) ICT as Assisting Tools (c) ICT as Management of Learning and (d) ICT as Medium of Teaching & Learning.

ICT as Object: It refers to learning about ICT. Mostly organized in a specific course. What is being learned depends on the type of education and the level of the students. ICT curriculum prepares students for the future occupation and social life. There are various types of short term, long term and modular courses being offered in this area to satisfy the ever growing demand of skill personnel in the software industry.

ICT as an Assisting Tool: ICT is used as a tool, for example while making assignments, collecting data and documentation, communicating and conducting research. It is independent from subject content. Generic assisting tools may be general or specialized in their application. Some of the examples of generic tools have been described below:

i. Word Processing and Publishing Tools : preparing, editing and producing written, tabular and graphical material;

ii. Freehand and Geometric Drawing Tools : devising and producing pictorial representations of events, ideas and artefacts;

iii. Database Tools: searching, storing, categorizing and arranging data and information;

iv. Statistical Analysis and Modeling Tools: deducing trends and patterns, organizing and synthesising information;

v. Multimedia and Authoring Tools :capturing, editing, modifying integrating text, graphics, audio & video information;

vi. Simulation Tools: devising and testing ideas and hypotheses, and projecting future consequences: Animation Tools-creating editing and modifying 2D and 3D animation.

ICT as Management of Learning: This refers to the application software used for organizing and management of institutions broadly refers as educational management information system. Use of ICT for record keeping and database, examination and other administrative purposes are some few applications of this category.

ICT as Medium of Teaching and Learning: This refers to ICT as a tool for the purpose of teaching and learning itself. More than three decades ago, computers and related information technologies were introduced to educators for direct teaching and learning purpose. It started with computer assisted instruction (CAI), Computer Based (CBT), then moved to Multimedia courseware and finally to Web Based instruction and Computer Mediated Communication (CMC) system. Using CAI for drill and practice of basic skills can be highly effective according to a large body of data and a long history of use (Nworgu, 2007). Students usually learn more, and learn more rapidly, in courses that use computer assisted instruction (CAI). This has been shown to be the case across all subject areas, from preschool to higher education, and in both regular and special education classes. Effective instruction requires presenting information, guiding the learner, practice, and assessment of student learning. The use of a computer to provide any combination of these factors may be termed computer-assisted instruction. It should be noted that there is no requirement that the computer provides all of these elements. Rather, any combination of these can be appropriate computer intervention in the learning process.

Interactivity, flexibility and learner control is the hallmark of these technologies. The application of educational technologies to instruction has progressed beyond the use of basic drill and practice software, and now includes the use of complex multimedia products and advanced networking technologies. Today, students use multimedia to learn interactively and work on class projects. They use the Internet to do research, engage in projects, and to communicate. The new technologies allow students to have more control over their own learning, to think analytically and critically, and to work collaboratively.

Guidelines for Using ICT in Technology Education Programmes in Nigeria

Nkanu and Okon (2010) proposed the following guidelines for using ICTs in Technology Education programmes:

i. Let learning outcomes drive the process of technology choice-Technology is only a tool therefore teachers must use technology as part of a total instructional plan;
ii. Strive to infuse and/or integrate technology into instruction and curriculum;
iii. Use the technology to shift the emphasis from teaching to learning;
iv. Be prepared to modify the role of the instructor- the teacher is not the only source of information; and
v. Use technology to move the focus away from low-level cognitive tasks to higher order thinking skills.

Barriers to the Utilization of ICT in Technology Education Programmes in Nigeria

Below is a list of some prevailing barriers that can limit the roles of ICT or the extent to which ICT can enhance instructional delivery in Technology Education programmes in Nigeria institutions:

1. Overcrowding in Nigerian institutions hindering effective usage of ICT facilities.
2. Poor maintenance culture in Nigeria hindering full and continuous utilization of ICT facilities.
3. Inadequate ICT infrastructures and general shortage of skilled ICT experts and instructors in Nigeria.
4. Erratic and inadequate electric power supply in Nigerian institutions.
5. Poor funding and misappropriation of ICT funds allocated to institutions.
6. High cost of purchasing modern ICT facilities and devices in Nigeria.
7. High rate of corruption, poverty and uneven distribution of public utilities in Nigerian institutions.
8. High cost of specialized ICT training in Nigeria.
9. Low access to ICT services due to the factor of "digital divide" and poor availability of ICT facilities and devices.
10. 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.

Conclusion

From the review, it was concluded that ICT plays a vital role in enhancing instructional delivery in tertiary technology education programmes in advanced countries and can also be useful in achieving success in instructional delivery in tertiary Technology Education programmes Nigeria's dwindling economy. For Nigeria economy to prosper and attain the goals of Technology Education, the barriers confronting the progress of ICTs in Nigeria Technology Education institutions 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 Nigerian Technology Education students and lecturers 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. Technology Education students and lecturers in Nigerian institutions 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. It is only ICT that can enhance effective instructional delivery in Technology Education programmes in Nigeria dwindling economy.

Recommendations

On the basis of this review, the following recommendations were made:

1. Provision of stable and adequate electric power supply.
2. Adequate funding of Nigeria Technology Education programmes, ICT training institutions and ICTs related departments in tertiary institutions by the various governments, private sector and other stake holders.
3. 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.
4. Re-orientation of our value system and creating awareness through various media on the importance of ICTs to instructional delivery in Technology Education programmes.
5. Periodic ICT policies performance review in Technology Education institutions.
6. 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.

7. Ensuring a stable and friendly atmosphere to attract skilled ICT experts and instructors that can train and retrain Nigerians Technology Education teachers and students on ICT usage and ICT production in Technology Education institutions.
8. Governments at various levels should lay more emphasis on ICT production rather than ICT consumption.
9. The ICT content in Nigeria Technology Education curriculum at all levels of schooling should be increased so that Nigerians can learn to think, love and embrace ICT.

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