UTILIZATION OF ICT FACILITIES FOR INSTRUCTION BY TVET EDUCATORS IN TERTIARY INSTITUTIONS IN NORTH CENTRAL, NIGERIA

IGWE, CHRISTOPHER OBETA

Senior Lecturer, Industrial and Technology Education Department, Federal University of Technology, Minna, Niger State, Nigeria
E-mail: christoigwe@gmail.com

Abstract - Technical and Vocational Education and Training (TVET) as a human training education programme which provides young people with the required knowledge and skills in the world of work. Along with the latest influx of Information and Communication Technology (ICT), significant developments and demands are taking place at a rapid intensity across the globe and across every area of human lives. Its success is greatly dependent on the adequacy of software and hardware ICT facilities being maximally utilized by the TVET educators in instructional delivery. This study carried out in the North Central, Nigeria tertiary institutions sought to determine the extent of utilization of ICT facilities for instruction by TVET educators. Two research questions and one hypothesis guided the study. Descriptive survey design was adopted. Population of the study consists of 74 TVET educators. The size was manageable, hence, there was no sampling. A 5-point scale validated questionnaire with reliability coefficient of 0.77 and 0.75 was used for data collection. Mean, standard deviation and ANOVA were used for data analysis. Findings revealed that the respondents utilized ICT facilities to a low extent as they lack skills and inadequacy of such facilities are main challenges encountered. The respondents differed significantly in their academic qualifications. The author then recommended that the government and other stakeholders should ensure adequate provision of ICT facilities and training of the educators of TVET programme among others.

Keywords - ICT Facilities, Software, Hardware, TVET Educators, Tertiary Institutions

I. INTRODUCTION

The Nigeria's philosophy of education is based on the belief that education is an instrument for national development and social change; education is vital for the promotion of a progressive and united Nigeria; education maximize the creative potentials and skills of the individual for self-fulfilment and general development of the society; education is the compulsory and a right of every Nigerian irrespective of gender, social status, religion, colour, ethnic background and peculiar individual challenges; and education is to be qualitative, comprehensive, functional and relevant to the needs of the society (Federal Republic of Nigeria, 2013).The authors posited that education plays a vital rolein the social, economic, political and cultural development of any human society globally. Many nations of the world invest greatly on education on the conviction that education makes man and man makes the world. Also, very key is the type, quality and the how of transmission of education.

The functionality of education is the determining factor in transforming the citizenry's mindset from a job seeking mentality to job creating mentality thereby increasing productivity and decreasing crime rate in the society. TVET is the type of education that will bring Nigeria out of the woods. TVET refers to 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 occupants in various sectors of economic and social life. In addition to technical knowledge and aptitude, increasing emphasis is on "softer" skills like communication, negotiation and teamwork (UNESCO &ILO, 2002; UNESCO, 2017 and Igwe, et al 2017).

The promotion of TVET is encapsulated in goal 3 of the Education 2030 agenda: "ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university". According to United Nations (2013), education that Africa needs is one that is skills-based, technologically grounded and globally competitive. The Federal Government of Nigeria had specifically stated that technical education is used as a comprehensive term referring to those aspects of the vocational processes 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 the sectors of the economic and social life. Consequently, the policy document outlined the objectives of TVET to include:

1. The inculcation of national consciousness and national unity.
2. The inculcation of the right type of values and attitudes for the survival of the individual and the Nigerian nation.
3. The training of the mind in understanding of the world around.
4. The acquisition of appropriate skills, abilities and competencies (FGN, 2013).

TVET is dispensed in public and private educational establishments, or other forms of formal non-formal

and informal settings aimed at granting all segments of the society access to life-long learning resources and is linked to the world of work. It develops knowledge and skills from the basic level to the most advanced level in a wide range of institutional and labour settings, and in different socio-economic contexts. A well-educated and skilled workforce is one of the core pillars of the knowledge-based economies (UNESCO 2005). This realization makes the reforms in education and development to remain a central pre-occupation for many countries and for international development. In every country at any given level of economic development, there is a great demand for education reform in order to be able to face the prevailing political, social and cultural changes as well as scientific and technological transformations (UNESCO Educational policy and Reforms 2008).

The author asserted that if education and human capacity development are critical steps for entering into the new global economy, e-learning should be considered as a critical facet of basic development, an efficient alternative medium of human capacity development and a means to population's empowerment and self-reliance. Changes in society, economy and culture led to a transition from an economy based on material goods to one based on knowledge. Knowledge has become the principal force of production over the last few decades and society has been transformed into a scientific civilization based on services, education, and creative activities as a result of a scientific/technological transformation based on technological progress and the increasing importance of computer technology and e-learning in its different forms ensuring quality education through quality teaching with ease of accessibility.

Saud, et al (2011) recommended the use of ICT facilities in the area of technology and vocational education to foster employability skills among the products in order to meet societal needs. Tasiret al (2005) then stipulate strategies for the effective integration of e-learning in technical and vocational education such as:

1. Use of on-line assignments.
2. Use of both synchronous tools (such as chatting) and asynchronous communication tools (such as forum and journal).
3. Lecturer-initiated communication for problem-based learning on the e-learning platform.
4. Frequent availability of lecturers on-line for facilitation and
5. Use of on-line journal for reflection and assessment.

Digital skills are the perspective of the new educational training, with a clear objective of educating and preparing students, allowing them to appropriate themselves of new ICT knowledge, tools that serve to include them within the educational system. The incorporation of new technological structures facilitates the incorporation of new approaches to teaching and evaluating students with ICT, for observing the progress they have made; that is, these competencies develop planning and organizational skills in education, which aids the construction of new knowledge, using technologies as tools in new scenarios (Sana & Adhikary, 2017). Moses (2001) noted that e-learning offers a powerful alternative to traditional form of learning that has worked for many centuries. Perhaps as importantly, it has forced us to rethink our working environments, what we need to learn, why we need that learning and how we go about measuring success. In some ways, that process may be as important as the new form of learning implementation. Just as changes in commerce have forced corporations to evaluate how they convey and add to their core capabilities to produce goods and services, so e-learning now offers a chance to rethink learning in many other sectors of society.

The author further identified innovative techniques that are being explored with the aim of achieving learners' attention, and establishing active and tailored learning environments wherein learners are able to pursue continuous learning, in a motivated manner, with the use of various tools of information communication technology in TEVT as follows:

1. Utilization of ICT resources has the capacity to enhance teaching skills and expand access to education and training in TVET. Instruction delivery is the core of every lesson. Instructional delivery refers to the act of sending information and procedures to comprehend and adhere by the receiver.
2. Utilization of ICT in Self-learning is based on well-designed computer-based course ware that allows students to teach themselves. Knowledge is a major asset and product of the society, upon which continued economic well-being aid social development depend in today's education, learning strategies have changed. Students can now decide on what to learn, when to learn, where to learn and how to learn.
3. Utilization of ICT in learners' online assessment is defined as the use of electronic media to determine a learner's educational status in relation to the variables of interest or intended learning outcomes. Assessment involves measuring a person's ability, knowledge, and performance in a given domain. The use of ICT in assessment can be conducted either online or offline setting.
4. ICT as a source of information has the potentiality to share and disseminate information in very faster rate. It empowers both teachers and students to send, receive and utilize information for their development.

Sources through which information are received include mobile phones, television, radio, computer, internet and social media.

Computer software is a program (set of instructions) that directs the operation of computer hardware. National Open University of Nigeria (2006) defines a computer software or just software as a collection of computer programs and related data that provide the instructions telling the computer what to do and how to do it. Software programs refer to a planned step-by-step instruction that turns a computer into useful electronic device, the software drives the hardware components of a computer system. Computer software is divided into three classes: system software, application software, and programming software.

Hardware is a comprehensive term for all of the physical parts of a computer system. National Open University of Nigeria (2006) refers to hardware as a general term for the physical artefacts of a technology. Hardware may also mean the physical components or items of a computer system that individuals can see or touch. Computer hardware is divided into two main categories: the system unit and peripherals. The system unit contains the electronic components used to process and temporarily store data and instructions. These components include the central processing unit (CPU), primary memory, and the system board. Peripheral devices are hardware used for input, auxiliary storage, display and communication (output). These are attached to the system unit through a hardware interface that carries digital data to and from main memory and processors such as web cameras, scanner, printer, keyboard, mouse, microphones, and removable storage devices among others.

In Nigeria, technology and vocational educators are usually trained in two categories of tertiary institutions. Tertiary institutions in the context of the study cover the two levels of tertiary education that train teachers for different subject areas, namely, colleges of education and universities. Some of these institutions situated within the area of study include; Colleges of Education, Minna, Niger State, Akwanga, Nasarawa State, Pankshin, Plateau State and Okene Kogi State, Federal University of Technology, Minna, Niger State, University of Jos, Plateau State and University of Ilorin, Kwara State, Benue State University, Nasarawa State University among others. The graduates of these institutions are awarded the Nigerian Certificate in Education (NCE) for colleges of education and Bachelor of Science and Bachelor of Technology (B.SC and B. Tech) degree for universities. It is presumed that the management of these institutions, through the government and other funding agencies, has provided relevant ICT facilities for instructional delivery in their schools. Nevertheless, maximum utilization of these facilities by educators for instructional delivery of TVET is very important. In addition, the institutions are owned either by the Federal or State government which may affect educators' utilization of ICT facilities and constraints they encounter in the process. The educators have different educational qualifications and teaching experiences which may affect their responses. This study, therefore, is aimed at determining the extent to which TVET educators in tertiary institutions in the North Central Nigeria utilize ICT facilities for instruction as well as whether significant difference exists in their mean ratings based on the controlling variables.

II. RESEARCH QUESTIONS

1. To what extent do TVET educators in tertiary institutions in North Central, Nigeria utilize hardware ICT facilities for instructional delivery
2. To what extent do TVET educators in tertiary institutions in North Central, Nigeria utilize software ICT facilities for instructional delivery

III. HYPOTHESIS

1. There is no significant difference in the mean ratings on the extent to which TVET educators utilize hardware and software ICT facilities as a result of academic qualifications (First degree, Master's degree and PhD)

IV. METHOD

The study adopted a descriptive survey research design. it is one in which a group of people or items are studied by collecting and analyzing data from only a few people or items considered to be representative of the entire group(Nworgu 2015, Maduekwe 2011) for studies that use the questionnaire to explore opinions of a given population or its representative sample on existing phenomena. The area of study was the North Central Zone of Nigeria comprising six states and FCT, Abuja, namely; Niger, Kogi, Plateau, Kwara, Benue, and Nasarawa.

The study population consists of all technology and vocational educators drawn from two levels of tertiary institutions that train teachers in the country, namely; university and college of education. The total number is 74. Sampling was not carried out since the population is not large. Instrument for data collection was a 5-point scale questionnaire which was validated by 3 experts in TVET. To establish the reliability of the instrument, it was administered to five lecturers in TVET programme from tertiary institutions in Kaduna State who were not part of the study and the data collected were analyzed with Chronbach Alpha. Reliability coefficients of 0.77 and 0.75 were obtained for the instruments. These were judged as evidence that the instrument was reliable and suitable for the study. Copies of the instrument were administered to the study sample by the

researcher and 5 research assistants and 61 copies were retrieved which is a response rate of 82.4%.
Data collected were analyzed with mean and standard deviation in order to answer the research questions and determine the homogeneity or otherwise of respondents from the mean while Analysis of Variance (ANOVA) was used to test the null hypotheses at .05 level of significance. An item with a mean rating of 3.00 and above indicates that respondents utilize it at a high extent (HE) or agree that it is a constraint in their utilizing while an item with a mean value less than 3.00 indicates that the respondents use it at a low extent (LE) or disagree that it is a constraint in their utilizing ICT facilities. A hypothesis will be rejected if the p-value is less than the significant level of 0.05 and upheld if the p-value is equal or greater than the significant level of 0.05.

V. ANALYSIS

Research Question 1: To what extent do technology and vocational educators in tertiary institutions in North Central Nigeria utilize hardware ICT facilities for instruction?

S/N	ICT hardware facilities for instruction	Mean	SD	Remarks
1	Digital reader for reading books on the screen	2.54	0.24	LE
2	Scanners for scanning documents	2.62	0.24	LE
3	Voice amplifiers like microphones	2.89	0.36	LE
4	Printers and copiers for production of materials	3.25	0.54	HE
5	Interactive smartboards for instructional delivery	2.49	0.26	LE
6	Multimedia projectors	2.64	0.21	LE
7	Internet enabled smart televisions	2.28	0.23	LE
8	Digital cameras for recording information	2.38	0.12	LE
9	Desktop computers for practical	3.25	0.51	HE

Grand Mean = 2.70

Table 1: Respondents' Mean Ratio and Standard Deviation on the Extent they Utilize Hardware ICT facilities for Instruction.

Data in Table 1 shows that only two out of the nine hardware facilities were listed, that is items 4 and 9 with Mean rating of 3.25 each are being utilized by the respondents to a high extent while the rest with Mean ratings from 2.28 to 2.89 are being utilized at a very low extent. The Standard Deviation values of 0.12 to 0.54 indicate that their responses are closely clustered around the Mean. The grand Mean of 2.70 indicates that the extent to which technology and vocational educators in North Central Nigeria tertiary institutions utilize hardware e-learning facilities is low.

Research Question 2: To what extent do technology and vocational educators in tertiary institutions in North Central Nigeria utilize software ICT facilities for instruction?

S/N	ICT hardware facilities for instruction	Mean	SD	Remarks
10	Data base software	3.80	0.87	HE
11	Electronic book	3.16	0.44	HE
12	Digital library for learning resources	2.69	0.21	LE
13	Word processing application	3.11	0.43	HE
14	Spreadsheet application	3.30	0.52	HE
15	Google classroom for teaching and learning	2.81	0.27	LE
16	Statistical and forecasting software-SPSS	2.79	0.23	LE
17	Desk publishing software	2.79	0.31	LE
18	Presentation software	3.02	0.35	HE
19	Zoom for group discussion and meetings	2.49	0.13	LE
20	Stimulation software for demonstration	2.87	0.29	LE
21	Learning management systems	3.48	0.58	HE
22	Graphic software for photoshop	2.57	0.36	LE

Grand Mean = 2.99

Table 2: Respondents' Mean Ratio and Standard Deviation on the Extent they Utilize Software ICT facilities for Instruction.

Table 2 shows that the respondents utilize six out of the thirteen software ICT facilities at a high extent (HE). These are items 10, 11, 13, 14, 18 and 21 with Mean values ranging from 3.02 to 3.80 while the rest (items 12, 15, 16, 17, 19, 20 and 22) with mean values ranging from 2.49 to 2.87 are being utilized at

a very low extent (LE). The Standard Deviation values of 0.13 to 0.87 shows that the respondents are homogeneous in their opinions. This also means that their responses are closely clustered around the Mean.

The grand Mean of 2.99 indicates that the extent to which TVET educators in North Central Nigeria tertiary institutions utilize software ICT facilities is low.

Source of Variation	Sum of Squares	Df	Mean Square	F	P-value
			2.159	13.232	0.000
Between groups	4.318	2	.163		
Within groups	15.176	93			
Total	19.494	95	90		

Table 3: Analysis of Variance (ANOVA) on Utilization of Hardware and Software ICT Facilities by Technology and Vocational Educators in Tertiary Institutions in North Central Nigeria and Their Constraints Based on Academic Qualifications (First Degree, Master's Degree and Ph.D) as Computed with SPSS.

Data in table 4 show that the P-value of 0.000 is less than the value of significance of 0.05, therefore the null hypothesis if rejected and the alternative hypothesis that technology and vocational educators in tertiary institutions in North Central Nigeria differ significantly in their utilization of hardware and software ICT facilities as well as their constraints based on academic qualification is not rejected.

VI. DISCUSSION OF FINDINGS

As stated by Dean (2002), the founder of Cognitive Arts, he believes that educational institutions must adopt a new way of teaching. He claims that students learn better through experiential and emotional learning rather than through memorizing names and dates and thus, educators must simulate real-world environments. ICTs can be used to facilitate these types of environments. An example of this is using flight simulators to train novice pilots, artisans, craftsmen, technicians and technologists' as well as several other vocational and technical instructors (Dean, 2002). The ICT applications based on the networking and communications technologies are becoming the fundamental tools for both administrative institutional management of teaching and learning methodologies on which planning, designing, implementation, and operation of TVET systems are being done. The use of e-learning encourages cooperative learning, enhances teaching and learning process, and encourages communication though websites, blogs and social networks. There is a need for the use of ICT in teaching in Nigerian schools, for effective instructional delivery. Unavailability and insufficiency of instructional materials are the main causes of the non-productive nature of Nigerian school system and poor academic performances of students in Nigerian schools. Thus, use of ICT as an instructional delivery in Nigerian schools has the potentials to enhance teaching and learning.

The absence of inadequacy of ICT infrastructure will totally hamper enhancement of access through e-learning adoption in tertiary institutions. There should be provision of computers and high bandwidth to enable the easy flow of classes online. This goes in line with the recommendation given by Abdel-Wahab (2008)and Sharma (2017) that if the ICT software and hardware facilities for e-learning is unavailable, the sequential use of predecessor distance learning technologies from correspondence courses to radio, television, CD-ROM, Internet and World Wide Web will be unattainable. Such a sequential use of predecessor distance learning technologies is poised to leverage the experience into a significant use in teaching and learning in TVET. Innovative strategies have to be adopted to remove the resistance of staff to change to e-learning approach. TVET's fundamental aim is to improve practical skills in learners, and gaining appropriate construction, design and repair skills requires well-functioning infrastructural and machinery facilities to ensure efficient, effective and sustainable employable skills for learners. In contrast, a lack of such facilities would impact student's enrolment in vocational institutions. For example, infrastructure inadequacy, lack of software and hardware ICT facilities continued to affect the full TVET capacity in Nigeria and other countries globally (Eze, Igwe & Nwachukwu 2021 and Ogbuanya, 2014), Bangladesh (Alam & Forhad, 2020), Kenya (Reuben et al., 2020) and Chile (Rojas et al., 2019).

VII. RECOMMENDATIONS

1. The government and other funding agencies should fund the purchase and maintenance of the ICT facilities needed for effective teaching and learning in TVET.
2. Training and retraining programme should be organized by the various TVET institutions so as to upgrade educators with the essential competency in the usage of ICT facilities for effective teaching and learning process.
3. Ministry of education, science and technology should engage in routine inspection in all TVET institutions to ensure minimum standard in terms of ICT facilities used and quality instructional delivery.

VIII. CONCLUSION

Hardware and software ICT facilities are utilized to a low extent by TVET educators in the institutions studied. Inadequacy of facilities and incompetency of the educators were key constraints. Nevertheless, ICT has the ability to change teaching and learning processes from greatly teacher-piloted to student-centered. The implementation and use of e-learning in education will also improve Nigeria's education system and TVET in particular, by enhancing teachers' instructional effectiveness if only ICT facilities are provided.

The most important aspect in using ICT for teaching and learning processes is that it increases interactivity and communication among learners and even teachers. Effective learning happens when learners are interactively engaged in a learning task. Learning using ICT is more than learning through memorization. It allows the learners to experience their learning process being interactive, enjoyable and fun filled with adequate provision and maximum utilization of ICT software and hardware facilities.

REFERENCES

[1] Abdul-Wahab (2008) Modeling Students' Intention to Adopt E-Learning: a case from Egypt. EJISDC 34, 1, 1-13.

[2] Alam, G. M., & Forhad, M. A. R. (2020). Roadblocks to university education for diploma engineers in Bangladesh. Higher Education, Skills and Work-BasedLearning. https://doi.org/10.1108/HESWBL-07-2019-009

[3] Dean, K. (2002). Wired News. Retrieved July 28, 2016, from http://www.wired.com/news

[4] Eze, P.C, Igwe, C.O, Nwachukwu, A.O (2021) Improving instructional delivery in TVET for skills development in era of covid-19 pandemic in Nigeria. Proceedings of the 34th annual national conference of technology education practitioners association of Nigeria. October, 18th-22nd 2021. Pp 179-185

[5] Federal Republic of Nigeria (2013). National policy on education. Lagos: Nigerian Educational Research and Development Council (NERDC).

[6] Igwe, C. O, Nwankwo, F. C, Akawu, L. A, Tauheed, H. N and Abubakar G. L (2017) Information technology service provision in Technical Vocational Education and Training (TVET): Implication for sustainable development in 21st century Nigeria. Benue State University Journal of Education [17] 3, 108-116

[7] Maduekwe, A.N. (2011). Research procedures in education: A practical guide. Lagos: Pumark Nig. Ltd.

[8] Moses, K. D. (2001). The role of E-Learning in Training and Development. TechKnowLogia, May/June, 2001. Available at: http://www.techknowlogia.org

[9] National Open University of Nigeria (2006). NOUN: A profile. Victoria Island, Lagos: National Open University of Nigeria

[10] Nworgu, B. G. (2015). Educational research: Basic issues and methodology. Nsukka: University Trust Publishers

[11] Ogbuanya, T. C. (2014). Workshop equipment and facilities as critical factors for sustainable skill acquisition through TVET in Nigeria.JORIND,12(2).https://www.transcampus.org/JORINDV12Dec2014/Jorind Vol12 No2 Dec Chapter38.pd

[12] Reuben, R., WanyekiP, & Hebert, D. (2020). Influence of Occupational Stereotyping on Enrolment in Technical Courses: A Case of Female Students in Technical Training Institutions in North Rift Region, Kenya. African Journal of Education, Science and Technology, 5(4), 3–10.

[13] Rojas, M. P., Tapia, P. B., Kemper, J. M., & Maldonado-Mariscal, K. (2019). Country Case Study: on Technical Vocational Education and Training(TVET) in Chile (Issue6). https://ethz.ch/content/dam/ethz/special-interest/dual/r4d-tvet4incomedam/documents/WP_7_CrossCase_Stud

[14] Sana, S., & Adhikary, C. (2017). Modern trends in pedagogical practices for teacher educational institutions, Int. Edu. & Res. J., 3(5), 697-701.

[15] Saud, M.S., Shu'aibu, B., Yahaya, N. and Yasin, M.A. (2011). Effective integration of information and communication technology (ICT) in technical and vocational education and training (TVET) toward knowledge management in the changing world of work. African Journal of Business Management(16), 6668-6673.

[16] Sharma, K. (2017) the impact of electronic document management on construction information management

[17] Tasir, Z., Harun, J., Hassan, A.H., & Mohd, K.Y. (2005). Effective strategies for integrating e-learning in problem-based learning for Engineering and Technical Education. Proceedings of the 2005 Regional Conference on Engineering Education, December 12-13. Malaysia: Johor.

[18] UNESCO (2008) Educational Policy and reforms Retrieved: http://www.Unesco.org/new/en/education/themes/planning/reforms

[19] UNESCO. (2017) "Technical and Vocational Education and Training (TVET)". www.unesco.org. Retrieved 1 April 2017.

[20] UNESCO, ILO (2002) Revised Recommendation concerning Technical and Vocational Education (2001). Paris: UNESCO; Geneva, Switzerland: ILO. http//unesdoc.unesco.org

[21] United Nations (2013)."Human Development Reports. United Nations Development Programme". hdr.undp.org. Retrieved 12th July, 2018.