Digital Technological Tools for TVET Interactive Learning: Availability and Utilization in Universities in Nigeria

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DOI: 10.56201/ijee.v8.no8.2022.pg1.11

Abstract

The study examined the availability and utilization of digital technologies for Technical Vocational Education and Training (TVET) interactive learning in Universities in South-East geopolitical zone in Nigeria. Two research questions and Two null hypotheses were formulated to guide the study. Descriptive survey design was adopted and purposive sampling technique was used to select 150 TVET educators from a population of 264 TVET educators in five Universities in the study area. A 60-item questionnaire of 4-point rating scale was used to gather data. The instrument was face validated by three research experts, and the reliability coefficient was established using Cronbach Alpha statistics which yielded a coefficient of 0.81. Mean and standard deviation were used to answer research questions while independent t-test was used to test the hypotheses at .05 level of significance. Findings of the study revealed that digital technologies are very lowly available and very lowly utilized for TVET interactive learning in the Universities. The findings of the hypotheses revealed no significant difference in the mean responses of TVET educators on the availability and utilization of digital technologies for TVET interactive learning in the Universities. Based on the findings of the study, the researchers recommended among others that government at all levels should provide adequate digital technological tools for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria.

Keywords: *Universities, Nigeria, digital technologies, TVET*

Introduction

Educational systems in the world are undergoing digital technological advancement to enhance effective instructional delivery. Digital technology according to Criollo-C, Guerrero-Arias, Jaramillo-Alcázar and Luján-Mora (2021), has expanded into all daily activities that are related to acquiring knowledge. Nzimande 2017, Amasi and Yellowe (2018), posited that the emergence of digital technologies has prompted researchers to predict the end of traditional pedagogical, didactic and philosophical approach to teaching. Nowadays, the teaching and learning environment has changed from talk and chalk in the classroom to a digital technological approach where all topics can be assessed through digital technological tools on devices (Abdullah, Saud & Mohd, 2021).

In the view of Hennessy, Ruthven and Brindley (2013), digital technology may be referred to as an extension of Information and Communication Technologies (ICT) which encompass a range of hardware, software applications and information systems that generate, store or process data. According to Olika, Moses and Sibongile (2019), digital technologies are electronic tools, systems, devices and resources that generate, store or process data. Hennessy, Ruthven and Brindley (2013), stated that digital technological tools include social media, online games and applications, multimedia, productivity applications, cloud computing, interoperable systems and mobile devices. Ozili (2020) and Olaitan (2020), stated that digital technologies platforms such as Microsoft teams, google hangout, skype, Bamboo learning, google classroom, Docebo, WiziQ Adobe captivate, Elucidat, GoToMeeting.com, Skype.com, Google Classroom/Open Online education (edu.google.com), Youtube.com, Blackboard.com, Udemy.com, Courser.org, Memory.com, Alison.com, Edx.org, Easyclass.com, Vedamo.com, Khanacademy.org, TED-Ed (ed.ted.com), Codeacademy.com, Stanford Online (Online.stanford.edu), Futurelearn.com, Rcampus.com, Learnopia.com, Peer 2 Peer University (p2pu.org), Teachers pay Teachers (teacherspayteachers.com), Thinkific (thinkific.com), MOOC.org, Openculture.com, Academicearth.org, itunesU Free Courses (apps.apple.com), lessonpaths.com, memrise.com, funbrain.com (for kids), whyville.net (for teens), edmodo (edmodo.com), schoology (schoology.com), classdojo (classdojo.com), google handouts (hangouts.google.com), zoom (zoom.us) and whatsapp.com allow educators upload their coursework for students quarantine at home and don't miss out on key aspects of their educational progression.

Dhawan (2020), UNESCO (2020) and World Bank (2020), opined that digital technologies has the potential to improve access to education and increase institutional enrolments. The appropriate use of digital technologies and pedagogical approach in teaching could generate an improvement in the learning results of the students (Krull & Duart, 2017). In the same vein digital technology according to Briz-Ponce, Pereira, Carvalho, Juanes-Méndez and García-Peñalvo (2017), enable educational institutions to utilize a set of features such as flexibility, ubiquity and portability in learning that will be of great benefit to teachers and students in the new digital era. Similarly, Corbeil and Corbeil (2015) and UNESCO (2020), stressed that digital technological tools enable teachers to work with experts outside their areas to enhance the quality and relevance of their training provision. According to Chai, Tan, Deng and Koh (2017), Göksün and Kurt (2017), Wagiran, Pardjono, Suyanto, Sofyan, Soenarto and Yudantoko (2019), skills for teaching and learning processes particularly with the pre-service teachers are vital for improving the integration of digital technologies in Technical vocational education and training (TVET) program to enhance effective productivity. Jihad (2013), Johnston, Loyalka, Chu, Song, Yi and Huang (2016), Nahdi and Jatisunda (2020), noted that digital learning systems are very demanding of qualified teachers in the field of technology.

The use of digital technologies in education according to Hashemi, Azizinezhad, Najafi, and Nesari (2011), presents many opportunities as well as many challenges. In the view of Bates (2015), digital technologies require infrastructural resources such as internet connectivity, computer/laptop, webcam, headset and printers. Lack of teacher preparedness also pose a serious challenge to shifting from traditional teaching methods to modern ICT-based teaching methods (Edwin and Stela, 2016; Carr, Balasubramanian, Atieno and Onyango, 2018). Edwin and Stela (2016), noted that lack of adequate funding hinders the development of infrastructure, training of staff in ICT implementation and application. The use of digital technology in Nepalese school and colleges are very limited because of many factors including lack of availability of resources, lack of poor infrastructure, large class

sizes, improper training for stakeholders, lack of manpower, and lack of teacher knowledge and skills to integrate ICT (Amasi &Yellowe, 2018; Budha, 2021).

In Nigerian educational system, universities offer Technical vocational education and training (TVET) programmes leading to the award of Bachelor of Science in Education (B.Sc Ed.) in Technical/Technology education to students who have fulfilled the University Faculty of Education requirements in broad areas of specialization such as automobiles, mechanical and metalwork technology, electrical/electronic technology, building, computer system maintenance, woodwork technology and technical drawing for the purpose of promoting the inculcation of requisite theoretical knowledge as well as practical skills in the students for increased productivity and sustainability upon graduation (FRN, 2013; Owo & Deebom, 2020, Keijzer, Rijst, Schooten & Admiraal, 2021; Cattaneo, Antonietti & Rauseo, 2022). In Nigeria today, very few conventional universities take up academic activities through digital technologies.

In the view of Adeoyeye, Afolabi and Ayo (2020), Wijaya and Utami (2021), educational system in Nigeria lack adequate digital technologies and hence do not adequately utilize them in learning and teaching. Nwachukwu and Asom (2015), Olelewe and Okwor (2017), noted low level of utilization of digital technologies in teaching. It is evident that inadequate provision of facilities is due to low levels of funding of educational institutions in Nigeria, and this makes it impossible to achieve the objectives of TVET as outlined in the Nigerian National Policy on Education (Rufai, Umar & Idris, 2013), with educational institutions turning out poorly educated graduates (Eze, 2013, Folu, 2013, Okolie & Asfa, 2017). Lack of adequate remuneration and rewards from the government according to Eze (2013), reduce the enthusiasm and commitment of academic staff in utilization of modern instructional facilities. Considering the potentials of digital technologies in teaching and learning, it is essential to assess its availability and utilization for TVET interactive learning in Universities in Nigeria.

Statement of the Problem

Knowledge acquisition is changing through digital technologies. One of the aims of digital technologies is to improve the quality of education and expand access to education. The education sector is expected to be technologically driven and requires that technological resources are fully integrated in it. Unfortunately, TVET education in Nigeria is lacking the necessary digital technologies needed to bring the education to international standards. Across Nigeria, Universities are underfunded with grossly inadequate facilities for effective TVET training and where facilities exist, they are obsolete which has contributed to a decrease in the quality of technical education graduates in Nigeria. Therefore, considering the potential of digital technologies, there is need to assess the availability and utilization of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria.

Purpose of the Study

The purpose of the study was to investigate the

1. Availability of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria.
2. Utilization of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria.

Research Questions

Two research questions guided the study

1. What are the digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria?
2. To what extent is the utilization of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria?

Hypotheses

Two hypotheses were formulated to guide the study:

1. There is no significant difference in the mean response of male and female lecturers on the availability of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria.
2. There is no significant difference in the mean response of male and female lecturers on the utilization of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria.

Methodology

The study was carried out in Universities in South-East geopolitical zone in Nigeria. The study employed descriptive survey research design. Nworgu (2006), noted that it is a design approach which aims at collecting data and describing them in a systematic manner, the characteristics, features or facts about a given population. Purposive sampling technique was used to select 150 TVET lecturers which comprised of 92 male and 58 female TVET lecturers in five Universities in South-East geopolitical zone in Nigeria.

The instrument use for data collection was a structured questionnaire titled: Digital Technologies for TVET Interactive Learning in Universities in Nigeria (DITTVETILUN). The questionnaire has Part A and B with thirty (30) items each for mean rating of respondents on availability and utilization of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria. A four-point rating scale of Very Highly Available (3.50-4.00), Highly Available (2.50-3.49), Lowly Available (1.50-2.49) and Very Lowly Available (1.00-1.49) was provided for respondents to make their responses on availability and utilization of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria. Similarly, the cut-off points for the interpretation of the mean of the respondent's opinions on digital technologies utilization were Very Highly Utilized (3.50-4.00), Highly Utilized (2.50-3.49), Lowly Utilized (1.50-2.49) and Very Lowly Utilized (1.00-1.49).

The instrument was face validated by one expert from the department of Measurement and Evaluation, University of Port Harcourt and two experts from the Department of Technical Education, Ignatius Ajuru University of Education all from the in Rivers State. The experts after examining the instrument, made some corrections based on the ambiguity of the statement, comprehensiveness, adequacy and relevance to set objectives of the study and corrections were effected from the experts opinion. In order to ensure the reliability of instrument, ten males and ten females TVET lecturers were trial tested in the University of Port Harcourt, Rivers State and University of Uyo, Akwa Ibom State who were not part of the area of study. The data collected were computed using Cronbach Alpha technique. The internal consistency of the instrument was obtained as thus: Section A = 0.86; Section B = 0.80; Section C = 0.84; Section D = 0.88. These reliability co-efficient values were considered appropriate for the study.

The researchers administered the instrument directly to the respondents in the universities with the help of three research assistants who were instructed on what is required. The instrument was collected immediately after completion and yielded 96% return rate. The research data collected were analyzed using mean and standard deviation while t-test was

used to test the null hypotheses at .05 level of significance. When the calculated t-value is greater than the tabulated t-value, null hypotheses is rejected. When the calculated t-value is less than the tabulated t-value, null hypothesis is upheld.

Research Question 1: What are the digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria?

Table 1: Digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria.

S/N	Digital Technologies	Male		Female		Decision
		X	SD	X	SD	
1.	Class dojo	1.03	.71	1.05	.67	VLA
2.	CommonLit	1.01	.69	1.07	.74	VLA
3.	Diksha	1.14	.63	1.03	.69	VLA
4.	Dropbox	1.07	.58	1.08	.54	VLA
5.	Duolingo	1.11	.75	1.19	.53	VLA
6.	Edmodo	1.09	.69	1.02	.56	VLA
7.	Edpuzzle	1.06	.55	1.13	.52	VLA
8.	ePals	1.12	.77	1.16	.70	VLA
9.	Epic	1.17	.73	1.04	.66	VLA
10.	Evernote	1.08	.59	1.06	.79	VLA
11.	Extramarks	1.00	.78	1.15	.68	VLA
12.	Flipgrid	1.15	.51	1.17	.74	VLA
13.	Formative	1.07	.74	1.14	.53	VLA
14.	FormsApp	1.05	.79	1.21	.58	VLA
15.	GeoGebra	1.16	.48	1.11	.63	VLA
16.	Kahoot	1.38	.71	1.07	.44	VLA
17.	Liveband	1.22	.76	1.19	.67	VLA
18.	Noon Academy	1.19	.58	1.25	.76	VLA
19.	Padlet	1.04	.57	1.08	.41	VLA
20.	Peergrade	1.11	.75	1.05	.39	VLA
21.	Playposit	1.13	.70	1.12	.69	VLA
22.	Pocket	1.09	.64	1.22	.54	VLA
23.	Quizizz	1.24	.56	1.03	.74	VLA
24.	Remind	1.03	.72	1.24	.79	VLA
25.	Seesaw	1.20	.69	1.18	.64	VLA
26.	Skype	1.08	.68	1.10	.73	VLA
27.	Slack	1.14	.51	1.23	.56	VLA
28.	Tick Tick	1.17	.50	1.17	.60	VLA
29.	Trello	1.05	.73	1.13	.71	VLA
30.	Zoom	1.28	.55	1.04	.78	VLA
	Total	**1.22**	**.65**	**1.09**	**.63**	**VLA**

Note: VLA = Very Lowly Available

The data presented in table 1 indicate total mean of 1.22 and 1.09 with standard deviation of 0.65 and 0.63 for male and female respondents respectively. This indicate that digital technologies are very lowly available for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria.

Research Question 2: To what extent is the utilization of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria?

Table 2: Utilization of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria.

S/N	Digital Technologies	Male		Female		Decision
		X	SD	X	SD	
1.	Class dojo	1.21	.57	1.18	.78	VLU
2.	CommonLit	1.11	.71	1.09	.75	VLU
3.	Diksha	1.17	.52	1.07	.69	VLU
4.	Dropbox	1.08	.59	1.14	.74	VLU
5.	Duolingo	1.01	.76	1.22	.81	VLU
6.	Edmodo	1.12	.68	1.08	.73	VLU
7.	Edpuzzle	1.06	.54	1.23	.72	VLU
8.	ePals	1.14	.63	1.31	.67	VLU
9.	Epic	1.29	.49	1.33	.59	VLU
10.	Evernote	1.25	.53	1.24	.66	VLU
11.	Extramarks	1.13	.55	1.27	.80	VLU
12.	Flipgrid	1.27	.67	1.19	.39	VLU
13.	Formative	1.19	.75	1.21	.68	VLU
14.	FormsApp	1.23	.70	1.15	.49	VLU
15.	GeoGebra	1.04	.79	1.26	.64	VLU
16.	Kahoot	1.31	.65	1.20	.77	VLU
17.	Liveband	1.24	.53	1.28	.79	VLU
18.	Noon Academy	1.18	.61	1.11	.48	VLU
19.	Padlet	1.22	.50	1.09	.66	VLU
20.	Peergrade	1.07	.74	1.16	.51	VLU
21.	Playposit	1.16	.56	1.33	.37	VLU
22.	Pocket	1.08	.66	1.03	.71	VLU
23.	Quizizz	1.20	.61	1.23	.58	VLU
24.	Remind	1.10	.76	1.29	.49	VLU
25.	Seesaw	1.11	.73	1.32	.61	VLU
26.	Skype	1.26	.71	1.25	.57	VLU
27.	Slack	1.17	.68	1.18	.76	VLU
28.	Tick Tick	1.12	.77	1.29	.72	VLU
29.	Trello	1.21	.58	1.27	.75	VLU
30.	Zoom	1.28	.72	1.26	.63	VLU
	Total	**1.67**	**.64**	**1.48**	**.65**	**VLU**

Note: VLU = Very Lowly Utilize

The data presented in table 2 indicate total mean of 1.67 and 1.48 with standard deviation of 0.64 and 0.61 for male and female respondents respectively. This indicate that digital technologies are very lowly utilized for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria.

Hypothesis 1: There is no significant difference in the mean response of male and female lecturers on the availability of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria.

Table 3: Independent t-test analysis on availability of digital technologies for TVET interactive learning in Universities.

Variable	N	$\bar{X}$	SD	df	t-cal.	t-crit.	Decision
Male	92	1.22	0.65				
				148	1.18	1.67	NS
Female	58	1.09	0.63				

Note: NS = Not Significant.

Table 3 showed that the t-cal was 1.18 while the t-crit was 1.65. Since the t-cal at 148 degree of freedom is less than t-crit, thus the null hypotheses of no significant difference between the responses of male and female TVET lecturers on the availabilities of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone in Nigeria was upheld.

Hypotheses 2: There is no significant difference in the mean response of male and female lecturers on the utilization of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria.

Table 4: Independent t-test analysis on the utilization of digital technologies for TVET interactive learning in Universities.

Variable	N	$\bar{X}$	SD	df	t-cal.	t-crit.	Decision
Male	92	1.67	0.64				
				148	1.36	1.67	NS
Female	58	1.48	0.65				

Note: NS = Not Significant.

Table 3 showed that the t-cal was 1.36 while the t-crit was 1.65. Since the t-cal at 148 degree of freedom is less than t-crit, thus the null hypotheses of no significant difference between the responses of male and female TVET lecturers on the utilization of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone in Nigeria was upheld.

Discussion of Findings of the Study

The data presented in table 1 indicate total mean of 1.22 and 1.09 with standard deviation of 0.65 and 0.63 for male and female respondents respectively. This indicate that digital technologies are very lowly available for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria. The finding of the study is not in agreement with the study of Weller (2012), Edet and Francis (2013), Ogunode et al (2020) and Adeoye et al (2020) who stated that slide projector, power point projector, interactive whiteboard, internet services, video conferencing facilities, satellite, digital library, interactive radio and email are not available in tertiary institutions in Nigeria.

Table 3 showed that the t-cal was 1.18 while the tcrit was 1.65. Since the t-cal at 148 degree of freedom is less than tcrit, thus the null hypotheses of no significant difference between the responses of male and female TVET lecturers on the availabilities of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone in Nigeria is upheld. The finding of this study is not in agreement with the study carried out by Auta (2017), Ikpe, George and Archibong (2022), who concluded that there was no significance difference in the respondence opinions on the availability of ICT facilities in Nigerian educational system.

The data presented in table 2 indicate total mean of 1.67 and 1.20 with standard deviation of 0.64 and 0.65 for male and female respondents respectively. This indicate that

digital technologies are very lowly utilized for TVET interactive learning in Universities in South-East geopolitical zone, Nigeria. The finding of this study is not in agreement with the study carried out by Weller (2012), Edet and Francis (2013), Amasi and Yellowe (2018), Oguniode et al (2020) and Adeoye et al (2020) who concluded that modern ICT facilities are not utilized in tertiary institutions in Nigeria.

Table 3 showed that the t-cal was 1.36 while the t-crit was 1.65. Since the t-cal at 148 degree of freedom is less than tcrit, thus the null hypotheses of no significant difference between the responses of male and female TVET lecturers on the utilization of digital technologies for TVET interactive learning in Universities in South-East geopolitical zone in Nigeria is upheld. The finding of this study is not in agreement with the study carried out by Auta (2017), Ikpe, George and Archibong (2022), who concluded that there was no significance difference in the respondence opinions on the utilization of ICT facilities in Nigerian educational system.

Conclusion

The application of digital technology in TVET signifies a shift in the conventional learning paradigm towards more technology-based learning. The use of digital technologies for pedagogical purposes is a major factor for the enhancement of teaching and learning practices in the digitalized world. Based on the findings of this study, the researchers concluded that digital technology such Class dojo, CommonLit, Diksha, Dropbox, Duolingo, Edmodo, Edpuzzle, EPals, Epic, Evernote, Extramarks, Flipgrid, Formative, FormsApp, GeoGebra, Kahoot, Liveband, Noon Academy, Padlet, Peergrade, Playposit, Pocket, Quizizz, Remind, Seesaw, Skype, Slack, Tick Tick, Trello, Zoom are very lowly available and also very lowly utilized for TVET interactive learning in Universities.

Recommendation

The researchers recommend the following as a measure to invigorate digital technologies for TVET interactive learning in Universities in South-East geopolitical zone in Nigeria.

1. The universities should carry out e-readiness surveys in order to determine the availability of digital technological tools in TVET and hence fast track acquisition and installation of any missing tools for improved delivery of in-school and out-of-school learning content.
2. Government at all levels should allocate adequate funds to facilitate acquisition and installation of necessary digital technological tools and facilities.
3. Workshop, seminar and conferences should be organized to train and retrain lecturers on digital technological tools and facilities.
4. Government should connect the Universities to stable electric grid to enhance adequate utilization of digital technological tools and facilities.

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