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Needs to Incorporate Virtual Learning Tools in the Instructional Process of Undergraduate Students in Mechanical Technology Education in Nigerian Universities

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Abstract: *The study inveatigted the Needs to incorporate virtual learning tools in the instructional process of undergraduate students in mechanical technology Education in Nigerian Universities. Two research questions and two null hypothesis were raised and formulated respectively for analyses and testing in the study. Descriptive survey research design was adopted for the study. The population of the study comprised 68 mechanical technology education lecturers and students in Rivers State owned Universities; that is, 18 mechanical technology education lecturers (4 from Rivers State University, Port Harcourt and 14 from Ignatius Ajuru University of Education, Port Harcourt) and 50 mechanical technology education students (15 from Rivers State University, Port Harcourt and 35 from Ignatius Ajuru University of Education, Port Harcourt). It was a census as the entire population was studied. The instrument was a 5-point Likert rating scale of Very Highly Need (VHN) – 5, Highly Needed (HN) – 4, Moderately Needed (MN) – 3. Not Needed (NN) – 2, Highly Not Needed (HNN) – 1. The instrument was validated by two experts in the Department of Industrial Technical Education, Ignatius Ajuru University of Education, Port Harcourt and one expert in Department of Vocational Technology Education, Rivers State University, Port Harcourt. The reliability of the instrument was established using Cronbach Alpha reliability coefficient after administering the instrument to 6 lecturers and 4 students from Niger Delta University, Wilberforce Island. Bayelsa. The instrument yielded clusters of reliability coefficient of .86 and .87 with the overall reliability coefficient of .87. Mean was used to answer the research questions while standard deviation was used to determine the homogeneity or the heterogeneity in the responses of the respondent whereas the t-test was used to test the hypotheses at 0.05 level of significance. The findings of the study revealed that there is no significant difference between the mean responses of lecturers and students on the needs to incorporate virtual learning tools in the instructional process of undergraduate students in machine shop and welding and fabrication technologies in Nigerian Universities. Based on the findings, it was recommended that The three tiers of government in Nigeria should work out appropriate policy and legislative frameworks to subsidize the procurement, installation and maintenance of e-learning technologies in the nation's tertiary institutions in particular and education in general in other for it to be incorporated in the instructional process of undergraduate students in machine-shop technology in Nigerian Universities; Appropriate policies should be enunciated to sustain the procurement of durable, cost-effective and user-friendly e-learning technologies for the nation's tertiary institutions of learning for it to be incorporated in the instructional process of undergraduate students in welding and fabrication technology in Nigerian Universities.*

Keywords: Universities, Virtual Learning Tools; Instructional Process, Undergraduate Students and Mechanical Technology Education

Introduction

Universities are higher learning institutions and academic environment, where a community of scholars engages in study (teaching and learning), research, and community services (Kotecha, 2012) in Wordu et al (2022). According to Ndlovu-Gatsheni (2017) in Wordu et al (2022), universities education are the totality of general and specialized knowledge and skills that enable a university graduate to solve problems that he/she encounters in industry or to perform scientific research or pedagogical work within the area of specialized knowledge that he has acquired. According to Gidado et al (2023), universities education includes undergraduate bachelor's degree followed by a master's degree, and a doctoral degree. This implies that those who take on the undergraduate bachelor's degrees are known as undergraduate students. Therefore, undergraduates Students are students who are pursuing a degree at the first level of higher education (meaning the level after secondary school) at a university. According to Anyebe (2022), undergraduate students are typically scholars working to earn a bachelor's degree (or, less commonly, an associate's degree). Anyebe further enlisted the following as the degrees obtained at undergraduate level in Nigerian universities could be in Arts, Business Administration, Engineering, Law, Medicine, Science, Technology or Education. On the other hand, Wordu et al (2023) listed the following courses among others as those obtained in education which include: Computer Science, Hospitality and Hotel Management, Management Science, Political Science, Agricultural Education, and Industrial Technology Education.

Industrial Technology Education is a form of university that furnishes its students with not only theoretical knowledge and pedagogical skills, but also hands-on experience in the various aspects of engineering and technology (Udoudo & Essien, 2021).

According to Ojimba (2013) in Ukomm and Agha (2015), Industrial technology education is a formal training of persons to become technicians in different occupations. Thus, any education that is geared towards teaching technical skills and attitudes suitable to such skills can be regarded as technical education. It is worth noting therefore that the achievement of the laudable goals of Industrial Technology Education in Nigeria depends largely on the availability of a well formulated Industrial Technology Education policy and its effective implementation (Anene-Okeakwa et al, 2020). According to Adesua (2022), the courses were offered under industrial technology education programme under automobile technology, building technology. Electrical/electronic and mechanical technology.

Mechanical technology education is a branch of Technical and Vocational Education and Training (TVET) which comprises of automobile and metal work technology education programmes. The former deals with the acquisition of automobile related skills for repair and production of automobile and its parts while the later deals with the acquisition of relevant skills for machining, manufacturing processes, welding and fabrication of metal, foundry or metal casting, sheet metal work, welding and fabrications, machining and steel structural works to mention a few. In the automobile options, we have panel beating and car chassis designers, motor engine block designers and production, auto-electricians and auto air conditioning works among others (Tani & Kalus, 2019). In some tertiary institutions, these programmes are operated independently from each other, whereby automobile technology is regarded as a course of study while metal work technology is regarded as another course of study; nevertheless, in some institutions the two are collapsed into one programme known as mechanical technology education (Amadi et al, 2022). The courses offered in University under mechanical technology education are metalworking technology, foundry technology, machine shop technology, welding and fabrication technology among others.

Machine-shop technology is one of the courses offered in mechanical technology education that prepares the students to shape metal parts on machines such as lathes, grinders, drill presses, milling machines and shapers. This course includes instruction in safety, making computations related to work dimensions testing feeds and speeds of machines using precision measuring instruments such as layout tools, micrometers and gauges, machining and heat-treating various metals and in laying out machine parts. The students will also learn how to use measuring tools and instruments and the use of computers to gain the ability to write and execute programmes associated with computer numerical control (CNC) lathes and milling machines

On the other hand, welding and fabrication technology is one of the courses offered in mechanical technology education that deals with joining, managing, and scraping the metal, but welding remains a more fundamental activity that requires only a single task. In comparison, metal fabrication revolves around several tasks; that is, welding, scraping, and joining metal parts among others to the level of good craftsman (Peter et al, 2010 in Nwala, 2022). In a broad sense, welding and fabrication technology provides students with an integrated learning experience, combining theoretical knowledge with practical, hands-on skills in a blend of classroom and workshop (Timings, 2018). Buttressing the position Peter et al on hands-on skills in a blend of classroom and workshop, Atherson (2013) cited in Nwala, (2022) opined that students' achievement is dependent upon several factors among which are learning environment and instructional tools.

Instructional process is the teaching /learning activity which starts with the definition of what the learners should know and finishes with the evaluation of what the learners actually know. Basically the teacher has to decide what to teach, and how to teach, that is; the teacher has to choose contents/skills and methods of her/his teaching activity. The instructional process consists of several different steps. According to the specific teacher's style and teaching model, different schemes can be defined and used. Hence, the virtual learning tools.

Virtual learning tools refer to any programme, application, or technology that can be accessed via an internet connection and enhance a teacher's ability to present information and a student's ability to access that information. Examples of virtual learning tools include online courses, content platforms, and Massive Open Online Courses (MOOCs). These tools save time and money, and give more people access to the specific learning they need to do their jobs. However, the technologies used have to be chosen and implemented with care. Virtual learning tool is any website, program, or application that can be accessed via the internet and will enhance teaching and learning. Virtual learning tools can assist teachers and students with teaching, learning, and communication. There are a wide variety of tools to use in online education. One tool that can be helpful to teachers and students is the assistive technology tools of speech to text and text to speech. another online education tool is an application for educational usage can help support teaching and learning. Virtual learning tools are mostly accessed via the internet but can be used at home or in a school setting. They can help students more deeply understand the content their teacher is sharing. Hence the study on the needs to incorporate virtual learning tools in the instructional process of undergraduate students in mechanical technology education in Nigerian Universities.

Review of Related Literature

Lukmon (2019) investigated the utilization of e-learning resources among tertiary students in Ogun State, Nigeria. The study was conducted using a descriptive survey design. Three hundred and eighty-one (381) tertiary students in the area randomly selected for

the study. A researcher questionnaire titled 'Utilization of E-learning Resources Questionnaire (UERO)' with a Cronbach's Alpha reliability coefficient of .76 was used to collect data. Frequency counts, percentages, means, t-test and ANOVA statistics were used to analyze the data. The findings were that there is a significant difference in utilization of e-learning resources based on class and institutions. However, there is no significant difference based gender and age. It is recommended that tertiary institutions re-design their general studies curriculum to include e-learning skills so to help students to understand how they can utilize e-learning resources.

The reviewed study is related with the present study because both studies dealt with e-learning resources among tertiary students. Both studies also used means and t-test statistical tools. Nevertheless, they differ in their research topics and design, aim and objectives, population, area of studies and findings.

Chuma (2018) examined the utilization of e-learning technologies by undergraduate students in the College of Education (COED), Michael Okpara University of Agriculture, Umudike (MOUAU). The design of the study involved a combination of descriptive survey research and linear correlation. Six objectives and two hypotheses were formulated to guide the study. A blend of accidental and stratified sampling technique was used to select a sample of 420 undergraduate students. Four hundred and eleven (411) copies of the self-designed questionnaire was returned which gave a 97.9% response rate. Descriptive and inferential statistics were used for data analysis while hypotheses were tested with PPMC and t-test analytical techniques. The results were presented in frequency tables. The findings revealed that awareness of e-learning technologies amongst undergraduate students is quite high (mean=2.89); several types of e-technologies are used (mean=2.70); there is a high preference for audio conferencing (mean=2.98), applications sharing (2.96) and forum (2.94) as media of learning. The result also revealed that undergraduate students use e-learning technologies for different educational purposes (mean=2.96). Furthermore, the test of H_O1 produced a strong correlation between awareness and utilization of e-learning technologies amongst undergraduate students in COED, MOUAU.

The reviewed study is related with the present study because both studies dealt with e-learning technologies by undergraduate students in Nigerian universities. Nevertheless, they differ in their research topics and design, aim and objectives, population, statistical tools, area of studies and findings.

Eze et aL (2018) studied the utilization of e-learning facilities in the educational delivery system of Nigeria: A study of M-University. The study adopted qualitative approach to investigate the adoption and utilization of e-learning facilities by lecturers in a Nigerian private tertiary institution using 15 semi structured interviews from the academic staff of M-University. Raw data gathered were analyzed using data driven thematic approach (a similar approach to grounded theory).The findings reveal that M-University's e-learning facilities are adequate and accessible to users, and most teachers are comfortable with utilization of various facilities during classes compared to most public tertiary institutions although, the utilization has not been maximized. However, attitude of users, inadequate internet facility, inadequate training of users affect the successful adoption. The study recommends that e-learning facilities should be constantly upgraded, and that M-University should train their staff continuously to meet the constant advancements of the e-Learning facilities in order to maximize usage.

The reviewed study is related with the present study because both studies dealt with e-learning facilities in the educational delivery system of Nigeria. Nevertheless, they differ in their research topics and design, aim and objectives, population, statistical tools, area of studies and findings.

Adeyeye et al (2014) examined virtual learning in Nigerian universities: A Panacea for enhanced academic standards. The study was conducted using Free and Open Source Software (FOSS). Two hundred and fourteen (214) students in Covenant University were randomly selected. The system is based on third party software or FOSS called phpBB and Windows 2003 Server Active Directory Services through e-mail addresses were used as the instrument. Both are installed and configured on an intranet. It has a discussion forum which is accessed through Hypertext Transfer Protocol using a web browser; and directory services for files/folders upload and download based on a set of privilege levels in Discretionary Access Control List (DACL) as a way of improving security. In operation, each department has unique username (Log-in ID) with password while all students share same username with password. Illustratively, the privileges have been set in a manner that a lecturer from department A has Write access only to the folder designated to his department though he has Read access to all folders meant for other departments. Students have equal read access to all folders of the various departments. This read privilege granted to all staff and students enables them to have access to resources from other departments if need be. Files transferred cannot be deleted by the lecturer or students. By this, a lecturer in same department cannot delete his or other lecturers' files without contacting his departmental administrator. The privileges are set in an environment called Access Control List (ACL). Means and standard, t-test statistics were used to analyze the data. The findings lead to the creation of a

virtual campus in Covenant University which enhanced the level of e-participation, and e-readiness of the graduate for the employment market.

The reviewed study is related with the present study because both studies dealt with virtual learning in Nigerian universities. However, they differ in their research topics and design, aim and objectives, population, area of studies and findings.

Statement of the Problem

Over a decade, Universities in the developing world have been witnessing decline in the standards of education. Predominantly, in Nigeria, Universities are facing serious challenges ranging from poor funding to poor quality of academic output, insecurity, and cultism among others. The reasons for this fallen standard in education according to Ashimolowo et al (2023) were traced to poor educational processes, particularly, teaching methods and materials. Besides, the teachers across the various tiers of learning had embarked repeatedly on strike actions to press home the demands for better funding of education and improved conditions of service to arouse their commitment to the noble profession. Therefore, the need for the use of information and communication technology (ICT) was identified as a major tool for improved standards. Hence, needs to incorporate virtual learning tools in the instructional process of undergraduate students in mechanical technology education in Nigerian Universities

Objective of the Study

The main objective of the study was to determine the needs to incorporate virtual learning tools in the instructional process of undergraduate students in mechanical technology education in Nigerian Universities. Specifically, the study determined the:

1. needs to incorporate virtual learning tools in the instructional process of undergraduate students in machine shop technology in Nigerian Universities.
2. needs to incorporate virtual learning tools in the instructional process of undergraduate students in welding and fabrication technology in Nigerian Universities.

Research Questions

The following two research questions guided the study:

1. What are the needs to incorporate virtual learning tools in the instructional process of undergraduate students in machine shop technology in Nigerian Universities?
2. What are the needs to incorporate virtual learning tools in the instructional process of undergraduate students in welding and fabrication technology in Nigerian Universities?

Hypotheses

The following two null hypotheses were formulated to guide the study at .05 level of significance:

H_O1: There is no significant difference between the mean responses of lecturers and students on the needs to incorporate virtual learning tools in the instructional process of undergraduate students in machine shop technology in Nigerian Universities.

H_O2: There is no significant difference between the mean responses of lecturers and students on the needs to incorporate virtual learning tools in the instructional process of undergraduate students in welding and fabrication technology in Nigerian Universities.

Theoretical Framework

This study was guided by the Engagement Theory as postulated by Kearsley and Shneiderman (1998). The Theory provided a framework for technology-based learning and teaching, based on a foundational understanding that 'students must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks to achieve an optimal learning experience'. In this theory, it envisaged that students are constantly involved in active cognitive processes such as creating, problem-solving, reasoning, decision-making, and evaluation. In addition, students are intrinsically motivated to learn due to the meaningful nature of the learning environment and activities.

The relevance of this theory to the study is that students must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks.

Methodology

The study adopted a descriptive survey design. The population of the study comprised 68 mechanical technology education lecturers and students in Rivers State owned Universities; that is, 18 mechanical technology education lecturers (4 from Rivers State University, Port Harcourt and 14 from Ignatius Ajuru University of Education, Port Harcourt) and 50 mechanical technology education students (15 from Rivers State University, Port Harcourt and 35 from Ignatius Ajuru University of Education, Port Harcourt) as gotten from Head of Departments of the institutions involved. It was a census as the entire population was studied. The

instrument that guided the study was structured questionnaire titled "Needs to Incorporate Virtual Learning Tools in the Instructional Process of Undergraduate Students in Mechanical Technology Education in Nigerian Universities (NIVLIPUSMTE)". The instrument was a 5-point Likert rating scale of Very Highly Need (VHN) – 5, Highly Needed (HN) – 4, Moderately Needed (MN) – 3. Not Needed (NN) – 2, Highly Not Needed (HNN) – 1. The instrument was validated by two experts in the Department of Industrial Technical Education, Ignatius Ajuru University of Education, Port Harcourt and one expert in Department of Vocational Technology Education, Rivers State University, Port Harcourt. The reliability of the instrument was established using Cronbach Alpha reliability coefficient after administering the instrument to 6 lecturers and 4 students from Niger Delta University, Wilberforce Island. Bayelsa. The instrument yielded clusters of reliability coefficient of .86 and .87 with the overall reliability coefficient of .87. Mean was used to answer the research questions while standard deviation was used to determine the homogeneity or the heterogeneity in the responses of the respondent whereas the t-test was used to test the hypotheses. All the copies of the instrument were completely filled and returned by the respondents. In answering the research questions, the criterion mean of 3.50 was used to compare with the calculated mean; therefore, any item with mean less than 3.50 was regarded as 'Not Needed', whereas any item with mean of 3.50 and above was regarded as 'Needed'. On the other hand, in testing the hypotheses; the t-calculated was compared to the t-critical in each case and if the t-calculated is less than the t-critical; the hypothesis of no significance difference was upheld or accepted; whereas if t-calculated is greater than or equal to t-critical, the hypothesis of no significant difference was rejected at 0.05 probability level of significance and appropriate degree of freedom respectively.

Data Analysis/Discussion

Research Questions 1: What are the needs to incorporate virtual learning tools in the instructional process of undergraduate students in machine shop technology in Nigerian Universities?

Table 1:

Mean and Standard Deviation of the Responses of the Lecturers and Students on the Needs to Incorporate Virtual Learning Tools in the Instructional Process of Undergraduate Students in Machine Shop Technology in Nigerian Universities

S/N	Needs to incorporate virtual learning tools in the instructional process of undergraduate students in:	Lecturers (n=18) $\bar{X}$	SD	Remarks	Students (n= 50) $\bar{X}$	SD	Remarks
1.	principles of machine-shop technology	3.98	.57	Needed	3.88	.57	Needed
2.	tools for measuring	3.98	.48	Needed	3.85	.58	Needed
3.	tools for cutting materials	3.98	.46	Needed	3.94	.49	Needed
4.	tools for machining	3.94	.47	Needed	3.86	.45	Needed
5.	turning operation	3.89	.52	Needed	3.84	.46	Needed
6.	milling operation	3.88	.47	Needed	3.82	.57	Needed
7.	grinding operation	3.90	.46	Needed	3.88	.62	Needed
8.	broaching operation	3.91	.46	Needed	3.91	.60	Needed
9.	shaper operation	3.96	.51	Needed	3.90	.62	Needed
10.	planer operation	3.96	.56	Needed	3.88	.54	Needed
11.	drilling operation	3.98	.57	Needed	3.88	.57	Needed
	GRAND	**3.94**	**.51**	**Needed**	**3.89**	**.59**	**Needed**

Source: Researcher's Survey (2022)

Table 1 dealt with the needs to incorporate virtual learning tools in the instructional process of undergraduate students in machine shop technology in Nigerian Universities. The table revealed that the mean responses of lecturers and students with grand mean of 3.94 and 3.89 respectively for items 1-11 were all needed in the instructional process of undergraduate students in machine shop technology in Nigerian Universities. This implies that the respondents agreed that there is need to incorporate virtual learning tools in the instructional process of undergraduate students in machine shop technology in Nigerian Universities. The standard deviation (SD) of the items with grand of .51 and .59 for lecturers and students respectively submits the homogeneity of respondents in their opinions.

Research Questions 2: What are needs to incorporate virtual learning tools in the instructional process of undergraduate students in welding and fabrication technology in Nigerian Universities?

Table 2:

Mean and Standard Deviation of the Responses of the Lecturers and Students on the Needs to Incorporate Virtual Learning Tools in the Instructional Process of Undergraduate Students in Welding and Fabrication Technology in Nigerian Universities

S/N	Needs to incorporate virtual learning tools in the instructional process of undergraduate students in:	Lecturers (n=18) $\bar{X}$	SD	Remarks	Students (n= 50) $\bar{X}$	SD	Remarks
	Welding Technology						
12.	principles of welding technology	4.74	.48	Needed	4.69	.46	Needed
13.	health and Safety	4.32	.53	Needed	4.28	.47	Needed
14.	manual metal arc welding process	4.28	.48	Needed	4.15	.50	Needed
15.	metal inert gas welding process	4.26	.56	Needed	4.15	.52	Needed
16.	tungsten inert gas welding process	4.23	.61	Needed	4.49	.53	Needed
17.	oxy-acetylene welding process	4.57	.64	Needed	4.36	.54	Needed
	Fabrication Technology						
18.	principles of fabrication technology	4.58	.61	Needed	4.34	.53	Needed
19.	cutting	4.57	.65	Needed	4.46	.52	Needed
20.	punching	4.58	.61	Needed	4.34	.53	Needed
21.	forming	4.53	.63	Needed	4.37	.53	Needed
22.	shearing	4.50	.56	Needed	4.08	.61	Needed
23.	metal stamping	3.96	.57	Needed	3.89	.55	Needed
	Digital Fabrication						
24.	use of computer-aided design software	3.98	.48	Needed	3.86	.58	Needed
25.	use of computer-aided manufacturing software	3.98	.46	Needed	3.95	.50	Needed
	GRAND	**4.34**	**.57**	**Needed**	**4.16**	**.54**	**Needed**

Source: Researcher's Survey (2022)

Table 2 dealt with the needs to incorporate virtual learning tools in the instructional process of undergraduate students in welding and fabrication technology in Nigerian Universities. The table revealed that the mean responses of lecturers and students with grand mean of 4.34 and 4.16 respectively for items 12-25 were all needed in the instructional process of undergraduate students in welding and fabrication technology in Nigerian Universities.. This implies that the respondents agreed that there is need to incorporate virtual learning tools in the instructional process of undergraduate students in welding and fabrication technology in Nigerian Universities. The standard deviation (SD) of the items with grand of .57 and .54for lecturers and students respectively submits the homogeneity of respondents in their opinions.

Hypotheses

H_O1: There is no significant difference between the mean responses of lecturers and students on the needs to incorporate virtual learning tools in the instructional process of undergraduate students in machine shop technology in Nigerian Universities.

Table 3:
The t-test Analysis of The Mean Responses of Lecturers and Students on the Needs to Incorporate Virtual Learning Tools in the Instructional Process of Undergraduate Students in Machine-shop Technology in Nigerian Universities

Respondents	N	$\bar{X}$	SD	P	df	t-cal.	t-crit.	Decision
Lecturers	18	3.94	.51					
				.05	66	.11	1.96	Accept
Students	50	3.89	.59					

Source: Researcher's Survey (2022)

Analysis on table 3 reveals that the t-cal (.11) is less than the t-cal (1.96). This implies that there is no significant difference between the mean responses of lecturers and students on the needs to incorporate virtual learning tools in the instructional process of undergraduate students in machine shop technology in Nigerian Universities. Hence, the null hypothesis was accepted. This implies that there is no significant difference between the mean responses of lecturers and students on the needs to incorporate virtual learning tools in the instructional process of undergraduate students in machine shop technology in Nigerian Universities. This finding is in line with the study of Ashimolowo et al (2023) who revealed that there is no significant difference between the achievement mean scores of students who learnt using a mobile learning application approach and those who used traditional textbook approach.

H_O2: There is no significant difference between the mean responses of lecturers and students on the needs to incorporate virtual learning tools in the instructional process of undergraduate students in welding and fabrication technology in Nigerian Universities.

Table 4:
The t-test Analysis of The Mean Responses of Lecturers and Students on the Needs to Incorporate Virtual Learning Tools in the Instructional Process of Undergraduate Students in Welding and Fabrication Technology in Nigerian Universities

Respondents	N	$\bar{X}$	SD	P	df	t-cal.	z-crit.	Decision
Lecturers	18	4.34	.57					
				.05	66	1.29	1.96	Accept
Students	50	4.16	.54					

Source: Researcher's Survey (2022)

Analysis on table 4 reveals that the t-cal (1.29) is less than the t-cal (1.96). This implies that there is no significant difference between the mean responses of lecturers and students on the needs to incorporate virtual learning tools in the instructional process of undergraduate students in welding and fabrication technology in Nigerian Universities. Hence, the null hypothesis was accepted. This implies that there is no significant difference between the mean responses of lecturers and students on the needs to incorporate virtual learning tools in the instructional process of undergraduate students in welding and fabrication technology in Nigerian Universities. This finding is in line with the study of Anekwe (2017) who opined that online learning has great effects on students' learning, although he concluded that online learning interaction needed to be structured, planned and sustained.

Conclusions

Despite the expanded and institutionalized use of e-learning technologies by the developed Western countries in their universities, the awareness has spread to developing countries who are now striving hard to catch up with their counterparts. Nigeria has realized the need to make the teaching and learning processes technology-driven. This national effort at increasing the use of e-learning technologies has led to policy, legislative and administrative measures. The result of this study is an upsurge in awareness of these devices amongst undergraduate students in the country.

Recommendations

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

1. The three tiers of government in Nigeria should work out appropriate policy and legislative frameworks to subsidize the procurement, installation and maintenance of e-learning technologies in the nation's tertiary institutions in particular and education in general in other for it to be incorporated in the instructional process of undergraduate students in machine-shop technology in Nigerian Universities.
2. Appropriate policies should be enunciated to sustain the procurement of durable, cost-effective and user-friendly e-learning technologies for the nation's tertiary institutions of learning for it to be incorporated in the instructional process of undergraduate students in welding and fabrication technology in Nigerian Universities.

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Appendix A

Population of the Study

S/n	Schools	Lecturers			Students	
		Full-Time	**Part-Time**	**Total**	**Year 2 & Year 3**	**Grand Total**
1.	Ignatius Ajuru University of Education, Port Harcourt	11	3	**14**	**35**	**49**
2.	Rivers State University, Port Harcourt	2	2	**4**	**15**	**19**
	Grand Total	**13**	**5**	**18**	**50**	**68**

Source: Researcher's Field Survey (2023); Obtained from the Office of the HOD's

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