

Readiness and Willingness of Electrical/Electronics Technology Students and Lecturers to Implement Virtual Teaching in North Central Nigerian Universities

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Abstract

The study investigated readiness and willingness of electrical/electronics technology students and lecturers to implement virtual teaching in North Central Nigerian Universities. Two research questions were raised and answered while two null hypotheses were formulated and tested. Descriptive survey research design was adopted for the study. A census sampling procedure was employed since the population of 232 respondents (217 EET students and 15 EET lecturers) was not too large to work with. A 16-item questionnaire developed by the researcher was validated by three experts. Cronbach's alpha reliability technique was used to ascertain internal consistency of the instrument which yielded a coefficient index of .80. Mean and standard deviation were used to answer research questions while T-test statistic was used to test the null hypotheses at 0.05 level of significance. The study revealed that: EET students and lecturers have access to ICT devices and internet to implement virtual teaching. The study recommended among others that: Government at all levels should occasionally initiate and implement programmes to train/support students and lecturers with ICT devices so that they can effectively implement virtual teaching/learning. Federal Government of Nigeria (FGN) through the Nigerian Communications Commission (NCC) should champion the provision of free public internet access so as to promote virtual teaching/learning for every citizen.

Keywords: Readiness, Willingness, ICT Devices, Internet Connectivity, Virtual, Virtual Teaching

Introduction

The education sector in the 21st century has shifted from traditional classroom teaching to digital and virtual learning environments. This transition became more urgent during the COVID-19 pandemic, which exposed the limitations of face-to-face instruction. Virtual teaching bridges the gap by offering flexible, accessible and technology-driven learning opportunities. According to Adedoyin and Soykan (2020) the integration of virtual teaching into higher education is still evolving, with various challenges and opportunities shaping its adoption and effectiveness. Omodan (2020) also noted that, in Electrical/Electronics Technology (EET), teaching is highly practical and requires

innovative approaches such as: Simulations, virtual laboratories and the use of digital tools. Virtual teaching helps students understand abstract concepts like electromagnetic fields and circuit behaviour through visualization. It also reduces risks associated with physical laboratories and provides access to expensive equipment through simulations (Omodan, 2020). This reflects the fact that success of virtual teaching is likely dependent on the readiness and willingness of both students and lecturers to adopt and utilize digital platforms effectively.

Readiness entails the extent individuals possess required skills, resources and mindset to participate in virtual teaching/learning (Wilson, Johnson & Lee, 2023). Johnson,

Smith and Peterson (2024) perceived readiness in educational technology contexts as "the extent to which individuals and institutions possess the necessary technological infrastructure, resources, skills and knowledge to effectively implement and utilize virtual teaching methodologies. Their definition emphasizes both tangible resources and human capabilities as essential components of readiness. More so, educational technology readiness encompasses not merely the availability of hardware and software, but also the technical competence, confidence and institutional support structures necessary for successful implementation (Johnson et al., 2024). This shows that readiness cannot be effectively achieved without the willingness of students and lectures to use virtual teaching tools. Wilson, Johnson and Lee (2023) defined willingness in technology adoption contexts as the motivational state reflecting an individual's intention and commitment to engage with new technologies, characterized by positive attitudes toward innovation and a disposition to invest time and effort in learning and implementing new systems.

This reflects the view of Adedoyin and Soykan (2020) who insisted that many students and lecturers lack technical competencies to effectively engage with virtual teaching tools, this poses as an implementation deficiency. Similarly, Almahasees, Mohsen and Amin (2021) argued that many students and lecturers were not adequately trained to use online teaching tools during the pandemic, which led to ineffective implementation of virtual teaching.

Virtual teaching refers to the process of delivering instruction, facilitating learning, and interacting with learners through digital technologies and online environments rather than relying solely on face-to-face classroom instruction. It enables teachers and learners to participate in educational activities from different physical locations using devices such as computers, tablets, and smartphones

connected to the internet (Martin, Sun & Westine, 2020). Virtual teaching can occur simultaneously, where teachers and students interact in real time through platforms such as video conferencing, or asynchronously, where students access recorded lectures, digital learning materials, assignments, discussion forums and other resources at their own convenience ((Martin *et al.*, 2020). In spite the laudable advantages that virtual teaching provides, many lecturers and students ICT devices and good internet connection to participant actively in such classes which affects effective implementation. These implementation deficiencies projects the fact that EET students and lecturers' readiness and willingness to use virtual tools for teaching/learning involves access to Information and Communication Technology (ICT) devices and internet connectivity.

ICT devices are the digital tools that enable the storage, retrieval, transmission, manipulation and presentation of information (Surajo, Tanimu, Mamman & Shu'aibu, 2020). These devices serve as the crucial bridge between educators and learners when physical presence is not possible. This shows that ICT devices cuts across: Computers and laptops, smartphones and tablets, headsets and webcams, e-readers and digital notebooks among many others. Dhawan (2020) stressed that ICT devices are the workhorses of virtual learning because they provide processing power for applications, multitasking capabilities and larger screens for extended study sessions. Chen, Zhang and Issacs (2021) insisted that most lecturers preferred high performance computers that support simultaneous running of video conferencing, presentation software and learning management systems that are essential for handling the processing demands of broadcasting quality instructions geared towards effective virtual teaching. This means that students and lecturers who have ICT

devices but lack internet connectivity may not effectively use virtual teaching/learning tools.

The internet is a global system of interconnected computer networks that uses standardized communication protocols [primarily the Internet Protocol Suite (TCP/IP)] to link devices worldwide. It is a network that consists of private, public, academic, business and government networks of local to global scope, linked by a broad array of electronic, wireless and optical networking technologies (Maryley & paker, 2017). Internet connectivity refers to the ability of devices, systems, or users to connect to the internet and access its resources. It encompasses the various technologies, services and infrastructure that enable this connection, including broadband, mobile data, Wi-Fi and satellite connections. The quality of connectivity is measured through factors such as: Bandwidth, latency, reliability and stability (Broadband Commission, 2019). Bolliger (2009) affirmed that consistent and reliable internet connectivity significantly enhances virtual teaching through: Uninterrupted instruction, enhanced engagement, access to rich multimedia resources, expanded teaching methodologies, effective assessment and feedback and reduced cognitive load and stress (Hodges, Moore, Lockee, Trust & Bond, 2020; Rapanta, Botturi, Goodyear, Guàrdia & Koole, 2020). This shows that with reliable and consistent internet connectivity, students and lecturers may easily and effectively implement virtual teaching/learning. It suffices to say that, effective implementation of virtual teaching/learning could depend on the readiness (availability of skills, tools and infrastructure) and willingness (attitude, motivation and acceptance) of both students and lecturers in North Central Nigeria Universities.

Statement of the Problem

The Nigerian university system has traditionally relied on conventional,

classroom-based instruction which has to do with talking and chalking. However, the emergence of virtual teaching offers a viable alternative to improved access, engagement, pedagogical effectiveness especially in EET. This virtual approach reduces the spread of communicable diseases such as tuberculosis, COVID-19 and the likes which could be transmitted in the air or through close contact with infected persons in the same physical classroom. It enables students to study from any location around the globe, saving transportation cost, acquiring digital literacy at minimum cost with ease of access to online libraries. This form of teaching also avails university lecturers with a convenient schedule, ability to reach a wider audience, enhance professional development and efficiency on the job.

In spite the benefits of virtual teaching, many universities in North Central Nigeria still struggle with implementation. Students often lack access to ICT devices and reliable internet, while lecturers may lack digital skills. Government and institutional effort through provision of computers and internet still falls short. This necessitates an urgent need to investigate how ready and willing EET students and lecturers are to implement virtual teaching in North Central Nigerian universities.

Purpose of the Study

The purpose of this study is to investigate the readiness and willingness of electrical/electronics technology students and lecturers to implement virtual teaching in North Central Nigerian universities. Specifically, the study examines:

1. The extent to which EET students and lecturers have access to ICT devices to implement virtual teaching in North Central Nigerian Universities.
2. The extent to which EET students and lecturers have access to internet connectivity for the implementation of

virtual teaching in North Central Nigerian Universities.

Research Questions

The study is guided by the following research questions:

1. To what extent does EET students and lecturers have access to ICT devices to implement virtual teaching in North Central Nigerian Universities?
2. To what extent does EET students and lecturers have access to internet connectivity to implement virtual teaching in North Central Nigerian Universities?

Research Hypotheses

The following null hypotheses are formulated and tested at 0.05 level of significance:

1. There is no significant difference in the mean responses of EET students and lecturers on access to ICT devices for implementing virtual teaching in North Central Nigerian Universities.
2. There is no significant difference in the mean responses of EET students and lecturers on access to internet connectivity for implementing virtual teaching in North Central Nigerian Universities.

Research Methods

The study adopted a descriptive survey research design. Population of the study consisted of 232 respondents across public universities that offer EET. This comprised of 217 EET students and 15 EET lecturers in North Central Nigeria. Census sampling procedure was adopted by collecting data from 232 respondents (217 EET students and 15 EET lecturers) that constitute the entire population of the study. A researcher developed 16-item questionnaire titled "Readiness and Willingness to Implement

Virtual Teaching Questionnaire (RAWTIVTQ) was used for data collection. The instrument was subjected to face validation by three experts, they critically examined and appraised the clarity of terms and relevance of content to minimize ambiguity of items which lead to the refinement of the research instrument.

A trial test was conducted using 10 respondents comprising of 6 EET students and 4 EET lecturers in University of Nigeria Nsuka, Enugu State since they possess similar characteristics but are not part of the sample size for the study. Ten copies of the questionnaire were given to the students and lecturers through direct contact with the aid of research assistants. Data collected was analyzed using Cronbach Alpha reliability technique to test for internal consistency of the research instrument and yielded a coefficient index of .80. The researcher collected data both virtually (google form) and through administration of the questionnaire to respondents via direct contact with the aid of 2 research assistants from each school.

Data collected was analyzed using descriptive statistics of mean and standard deviation to answer research questions. T-test was used to test the null hypotheses at 0.05 level of significance. Statistical Package for the Social Sciences (SPSS) version 26 was used to carry out the data analysis. Decision was based on results from data analysis using the four points rating scale of: Strongly Agree=4, Agree=3, Disagree=2 and Strongly Disagree=1. This means that 0.00-1.24=Strongly Disagree, 1.25-2.49=Disagree, 2.50-3.74=Agree and 3.75-4.00=Strongly Agree. The p and α values were also compared, hence, if $p > \alpha$, the null hypothesis was rejected and if $p < \alpha$, the null hypothesis was accepted.

Results

Data collected is analyzed and presented in tables in the order of research questions:

Research Question One

To what extent does EET students and lecturers have access to ICT devices to implement virtual teaching in North Central Nigerian Universities?

Table 1: Mean and Standard Deviation on the extent EET students and lecturers have access to ICT devices to implement virtual teaching in North Central Nigerian Universities

S/No	Items	EET Students		EET Lecturers		Mean Response		Remark
		M ₁	SD ₁	M ₂	SD ₂	M ₃	SD ₃	
1	I have a smartphone to attend online classes	3.86	.47	3.33	1.05	3.83	.54	Strongly Agree
2	I get a computer to use at the school ICT unit	3.63	.86	2.60	1.40	3.56	.94	Agree
3	I do not have any device to do online assignments	3.67	.87	2.53	1.13	3.60	.93	Agree
4	I do not have money to get a phone	3.27	1.15	3.13	.35	3.26	1.12	Agree
5	I have a personal laptop	3.71	.86	3.47	.92	3.70	.87	Agree
6	I have at least one device for virtual classes	3.48	.97	3.67	.49	3.49	.94	Agree
7	I am able to access online materials easily on my device	3.07	1.29	3.80	.41	3.12	1.26	Agree
8	Learning is made easier with a smart phone	3.87	.55	2.73	1.03	3.79	.65	strongly Agree
Total Mean						3.54	.91	Agree

Table 1 above shows the extent to which EET students and lecturers access ICT devices to implement virtual teaching. The data revealed a mean score of 3.54 and a low standard deviation of .91, signifying that the responses were clustered around the mean. This implies that EET students and lecturers have access to at least one ICT devices to

implement virtual teaching in North Central Nigerian Universities.

Research Question Two

To what extent does EET students and lecturers have access to internet connectivity to implement virtual teaching in North Central Nigerian Universities?

Table 2: Mean and Standard Deviation on the extent EET students and lecturers have access to internet connectivity to implement virtual teaching in North Central Nigerian Universities

S/No	Items	EET Students		EET Lecturers		Mean Response		Remark
		M ₁	SD ₁	M ₂	SD ₂	M ₃	SD ₃	
9	Internet connection is always available to conduct virtual classes	3.34	.90	3.73	.70	3.36	.89	Agree
10	I miss classes sometimes due to high cost of data	3.88	.32	2.80	1.01	3.81	.48	Strongly Agree
11	Time of internet availability is limited for learning	3.31	1.10	3.73	.46	3.34	1.08	Agree
12	Internet is not always stable for virtual classes	3.10	1.10	3.60	.51	3.13	1.08	Agree
13	Internet quality for online classes is affected during raining seasons	3.27	1.02	3.07	.26	3.25	.90	Agree
14	Clouds make it easier to save educational documents online	3.83	.47	3.07	.59	3.78	.51	Strongly Agree
15	Value added tax has made data more expensive	3.72	.64	2.80	.41	3.66	.66	Agree
16	Poor power supply affects access to WIFI	3.43	.85	3.00	.54	3.41	.84	Agree
Total Mean						3.47	.81	Agree

Table 2 above shows the extent EET students and lecturers access internet connection to implement virtual teaching. The data revealed a mean score of 3.47 and a low standard deviation of .81, signifying that the responses were clustered around the mean. This implies that access to internet connection by EET students and lecturers improves learning. Nonetheless, limited internet access, unstable network, power outages and high internet cost due to tax makes data purchase

expensive and hinder EET students and lecturers from maximizing the potentials of virtual teaching in North Central Nigerian Universities.

Hypothesis One

There is no significant difference in the mean responses of EET students and lecturers on access to ICT devices for implementing virtual teaching in North Central Nigerian Universities.

Table 3: T-Test Statistic on the extent EET Students and Lecturers Access ICT Devices for Implementing Virtual Teaching in North Central Nigerian Universities

Respondents	N	M	SD	t	Df	α	p	Remark
Students	217	28.56	2.57	4.81	230	.05	.00	Statistically Significant
Lecturers	15	25.27	2.49					
Total	232							

The result from table 3 was conducted to examine the significant difference between the mean scores of EET students and lecturers on their access to ICT devices for implementing virtual teaching. Students ($M=28.56$, $SD=2.57$) recorded a higher mean readiness score than lecturers ($M=25.27$, $SD=2.49$). The difference between the two groups was statistically significant $t(230)=4.81$, $p=.00<\alpha=.05$. This shows that the null hypothesis was rejected, implying that EET

students and lecturers differ significantly in their access to ICT devices for implementing virtual teaching.

Hypothesis Two

There is no significant difference in the mean responses of EET students and lecturers on access to internet connectivity for implementing virtual teaching in North Central Nigerian Universities.

Table 4: T-Test Statistic on the extent EET Students and Lecturers Access Internet Connectivity for Implementing Virtual Teaching in North Central Nigerian Universities

Respondents	N	M	SD	t	Df	α	ρ	Remark
Students	217	27.89	2.13	3.67	230	.05	.00	Statistically Significant
Lecturers	15	25.80	2.08					
Total	232							

The result from table 4 was conducted to examine the significant difference between the mean scores of EET students and lecturers on their access to internet connectivity for implementing virtual teaching. Students ($M=27.89$, $SD=2.13$) recorded a higher mean readiness score than lecturers ($M=25.80$, $SD=2.08$). The difference between the two groups was statistically significant $t(230)=4.81$, $p=.00<\alpha=.05$. This shows that the null hypothesis was rejected, implying that EET students and lecturers differ significantly in their access to internet connectivity for implementing virtual teaching.

Discussion of Findings

Hypothesis one revealed a significant difference in the mean responses of respondents on access to ICT devices by EET students and lecturers to implement virtual teaching. This aligns with the view of (Surajo, Tanimu, Mamman, & Shu'aibu, 2020) who affirmed that students in the current century

often possess ICT devices such as laptops and smartphones that makes it easier for them to study online. The also affirmed the view of Chen, *et al.* (2021) who insisted that most lecturers own computers that can support online teaching/learning. The findings equally collaborate the opinion of Adedoyin and Soykan (2020) who discovered that owing ICT devices by students and lecturers makes virtual teaching and learning flexible.

The findings from hypothesis one also relates with that of Morley and Parker (2017) who affirmed that most students and lecturers own a smartphone, this makes it easier for them to implement virtual teaching/learning. He findings equally affirmed the view of Raja and Nagasubramani (2018) who noted that having ICT devices enable students to access online materials, storage and retrieve same as well as do online presentations when the need arises.

The findings also aligned with the submission of Dhawan (2020) who insisted

that students and lecturers use computers to do online assignments and access new virtual learning sites during free times. This points to the fact that in the 21st century, most students and lecturers have access to ICT devices and this enhances the implementation of virtual teaching/learning of EET in North Central Nigerian Universities.

Hypothesis two revealed a significant difference in the mean responses of respondents on access to internet connection by EET students and lecturers to implement virtual teaching. This affirms the position of Chen and Williams (2024) who argued that through access to the internet, students and lecturers build global social networks that enhance both online classes as well as self-paced learning of educational materials. This also links with the findings of Castro and Tumibay (2021) who stated that access to internet under supervision improves cognitive abilities which also translates into improved academic achievement.

The findings also align with the submission of Garcia and Lee (2023) who stressed that virtual learning environments using the internet offers lecturers access to tools that enhance students' motivation, interest and involvement in learning. The findings also confirmed with that of Williams *et al.* (2024) who affirmed that students and lecturers find online learning very engaging and rewarding because it encourages cashing out and association with peers and lecturers.

The study also supports the view of Rivera *et al.* (2021) who projected that access to the internet provides students with information resources that enables more comprehensive research and learning opportunities. This also aligns with the position of Rapanta *et al.* (2020) who affirmed that access to qualitative network widens access to knowledge and expands personalized learning for students and lecturers engaged in online learning. The findings also projected the view of Hodges *et al.* (2020) who insisted

that good internet connectivity enables access to preferred websites and maximizes content coverage over a short period of time.

The findings also link with the view of Martin and Bolliger (2018) who opined that consistent and reliable internet connectivity significantly enhances students engagement and uninterrupted virtual teaching and learning. This means that with access to quality internet connection, students and lectures are likely to have a good experience and acquire requisite EET knowledge. More so, the findings reflects the position of Rapanta *et al.*, (2020) who stated that access to good internet connection by students and lecturers makes virtual teaching and learning very smooth and seamless. This implies that with effective internet connectivity, EET students and lecturers will implement virtual teaching/learning of EET subjects.

Conclusion

The study established that: EET students and lecturers have access to ICT devices and internet to implement virtual teaching, EET towards the use of virtual teaching tools in North Central Nigerian Universities. This means that with consistent support from relevant stakeholders, full implementation of virtual teaching/learning of EET courses will be sustained. It suffices to say that, the advantages of virtual teaching/learning cannot be disputed in this jet age, hence, will not only improve literacy level but also improve the quality of graduates in the world of work who clearly replicate in the field, what was learnt in the learning environment.

Recommendations

Based on the findings, the study recommended among others that:

1. Government at all levels should occasionally initiate and implement programmes to train/support students

and lecturers with ICT devices so that they can effectively implement virtual teaching/learning.

2. Federal Government of Nigeria (FGN) through the Nigerian Communications Commission (NCC) should champion the provision of free public internet access to so as to promote virtual teaching/learning for every citizen.

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