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## The Relationship between Educators' Attitudes, Perceived Usefulness, and Perceived Ease of Use of Instructional and Web-Based Technologies: Implications from Technology Acceptance Model (TAM)

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# The Relationship between Educators' Attitudes, Perceived Usefulness, and Perceived Ease of Use of Instructional and Web-Based Technologies: Implications from Technology Acceptance Model (TAM)

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## Abstract

Over the years, developing countries have experienced tremendous growth in access to information and communication technology (ICT). This growth in access to ICT has brought about massive changes in many sectors within the society, including education. Researchers explored teacher educators' attitudes and use of instructional and web-based technologies in teacher preparation programs. Researchers used Technology Acceptance Model (TAM) in this study. Using a mixed-method design, researchers examined the relationships between educators' attitudes and the use of technology. Findings from descriptive statistics have shown that educators exhibited overall positive attitudes toward technology. Pearson's product-moment correlation coefficient revealed relationship exists between perceived ease of use and perceived usefulness. Both quantitative and qualitative findings in this study have implications for educators and administrators in Nigerian education, especially, teacher preparation programs.

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## Introduction

Globally, there is a rapid growth in access to information and communications technology, developing countries are not excluded. Over the years, developing countries have experienced tremendous growth in access to information and communications technology (Ibrahim, 2019). This growth in access to information and communications technology has brought about massive changes in many sectors within society. For example, in Nigeria, the government (Federal, State, and Local) and stakeholders in education have devised means to revamp the country's education with technology access at all levels (Garba & Alademmerin, 2014). Nigeria, like many other developing countries, is faced with challenges regarding the integration of instructional and web-based technologies in teaching (Ibrahim, 2019). There is an absence of enormous empirical literature that explores teacher educators' attitudes and use of instructional and web-based technologies for teaching in the country's teacher preparation programs. The focus of this paper is to provide insight into the relationship between Nigerian teacher educators' attitudes, perceived usefulness, and perceived ease of use of instructional and web-based technologies.

The paper begins with a review of related literature and the theoretical framework that guides the conduct of this

research. Following this, a description of the problem and purpose of the study are provided. The paper also describes the methodology employed in this study. Finally, researchers discuss the quantitative and qualitative findings as they relate to the implications for educators, administrators, and stakeholders in Nigeria's education, specifically, teacher preparation programs.

## **Literature Review and Theoretical Framework**

The generation of students in the twenty-first-century classrooms prompted education systems around the world to embrace technology as a tool for instruction. Prensky (2006) elucidates that the education of children born in the digital age is considerably affected by the changes brought about by the information age. The U.S. Department of Education (2004) reviewed and updated the National Education Technology Plan (NETP) of 1999.

In this review, the United States Department of Education (2004) acknowledged the changes brought about by technology,

We have reached a turning point. All over this country, we see evidence of new excitement in education, a new determination, a hunger for change. The technology that has so dramatically changed the world outside our school is now changing the learning and teaching within them. (p. 6)

Since 2004, technology has been widely accepted and utilized for teaching and learning from PreK through 20 (U.S. Department of Education, 2004).

Technology attitude dictates educators' acceptance and use of technology. Dugger (2001) opines that "it is particularly important in this technological world that people understand and are comfortable with the concepts and working with modern technology" (p. 1). Upon this, educators and students develop a technology attitude. We often hear this phrase about technology attitude, "I have a positive attitude about technology." However, we seldom dig deep into the meaning of this phrase. Talking about an attitude toward an object, we are engaged in describing the evaluative interpretation of being positive or negative toward that object (Sevilla et al., 2006). Sevilla et al. (2006) clarify that,

When we speak of a positive or negative attitude toward an object, we are referring to the evaluative component. Evaluations are a function of cognitive, affective, and behavioral intentions of the object. Evaluation is stored in memory often, without the corresponding cognitions and effects that were responsible for its formation. (p. 358)

Van-Giesen et al. (2015), expressed that attitude results from preceding experience on knowledge and functions which shape an individual's attitude formation. Around the world, scholars have written extensively about educators' technology attitudes formation (Hart & Laher, 2015; Liu, 2016; Pittman & Gains, 2015; Varol 2012). Literature has shown that there is a strong relationship between educators' technology attitudes and use for teaching. Buabben-Andoh (2012) reports that "attitudes of teachers towards technology greatly influence their adoption and integration of computers into teacher" (p. 138). Research has shown that Nigerian educators who exhibit positive attitudes towards technology tend to use it for teaching (Aremu & Adediran, 2011; Kenechukwu & Oboko, 2013; Onwuagboke & Singh, 2016). Specifically, Onwuagboke and Singh (2016) studied educators' attitudes toward the use of Information and Communication Technology (ICT) in southwestern Nigeria. Findings

revealed that educators' acceptance and use of ICT in instructional delivery is strongly correlated with their attitudes toward technology integration, which results from their perceived benefits of integrating technology for instruction.

Educators' negative attitudes toward technology may affect their level of technology integration. Ajoku (2014) found that educators' negative attitudes toward technology have a tremendous impact on the use of technology for teaching. Oke (2013) suggests that there is a critical need to address educators' negative attitudes towards technology especially since technology is revolutionizing the way we teach and learn at a rapid speed. Despite educators' positive attitudes towards technology, instructional and web-based technologies are underutilized by educators. This study aimed at examining Nigerian teacher educators' attitudes, perceived usefulness, and perceived ease of use of both instructional and web-based technology for teaching. At this point, it is imperative to discuss the theoretical framework for this study.

### **Theoretical Framework: Technology Acceptance Model (TAM)**

Davis et al. (1989) developed the Technology Acceptance Model from Fishbein and Ajzens' Theory of Reasoned Action (TRA). TAM has gained popularity in terms of usage as it depicts the interaction of various components regarding attitude formation and technology use. These components include external variables, perceived usefulness (PU), perceived ease of use (PEU), attitude toward (A), behavioral intention to use (A), and actual system use. For this study, the external variables are technology tools available for educators to use, and A stands for a particular technology for a specific purpose in the classroom (example, an assessment technology). TAM put a great emphasis on perceived ease of use (PEU) and perceived usefulness (PU) of technology which influences an individual's attitude formation toward acceptance or rejection of technology (Davis et al., 1989). Figure 1 shows the various elements of the TAM as identified and explained by Davis et al. (1989).

Chen et al. (2011) posit that TAM provides a conceptual framework for predicting facilitating conditions on the acceptance and integration of technology. Several researchers have used TAM as a theoretical framework to describe factors that influence the acceptance of information systems. For example, Holden and Karsh (2010) mention that TAM would enable the prediction of factors that influence one's attitude toward the acceptance of technology. Thus, it enables administrators to utilize educators' potential by promoting acceptance and increasing technology utilization for teaching and learning purposes. Fathema et al. (2015) explored faculty use of Learning Management System (LMS). Researchers found that TAM had a statistically significant predictive value in terms of educators' attitudes toward using LMSs to deliver course materials. Also, Alharbi and Drew (2014) explored educators' behavioral intentions to use LMSs. They found that there was a strong relationship between educators' attitude to technology, perceived ease of use, and perceived usefulness of LMS which later influences their intention to utilize them for teaching and learning. Conclusively, Echeng et al. (2013) used TAM to explore students' acceptance and use of web 2.0 for learning in some selected in Nigeria. Results from this study revealed a strong correlation between students' attitude, usefulness, and ease of use of web 2.0 with behavioral intention and actual use of web 2.0 technologies for educational purposes. Echeng et al. (2013) suggest that TAM was reliable in predicting attitudes and behavioral intention to adopt a system (technology).

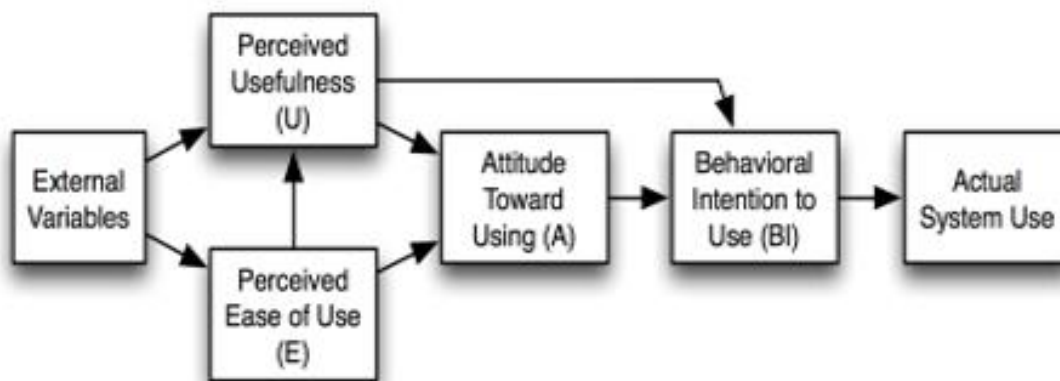


Figure 1. Technology Acceptance Model. First Modified Version Adapted from "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," by F. Davis, R. P. Bagozzi, and P. R. Warshaw, 1989, *Management Science*, 35(8), p. 985.

In this study, researchers adopted TAM as the theoretical framework because of its relevance and it served as a useful framework that will help to unravel the relationships between educators' attitudes, perceived usefulness, and perceived ease of use of instructional and web-based technologies.

### **Problem, Purpose, and Research Questions**

Technology integration in Nigerian teacher preparation programs is in its infancy (Garba et al., 2013). Ibrahim (2019) explains that Nigerian teacher educators are unaware of the various ways that technology can be utilized to enhance instruction. This is partly because, many Nigerian teacher educators lack technology integration skills (Garba et al., 2013; Ibrahim, 2019), and or educators were trained in traditional didactic settings when technology integration was not in any way part of their training as a result of digital divide existing between developed and developing countries (Ibrahim, 2019). The purpose of this study is to use Davis et al. (1989) Technology Acceptance Model (TAM) and examine Nigerian teacher educators' attitudes and use of instructional and web-based technologies in teacher preparation programs. This study was designed to answer the following research questions:

1. What are educators' attitudes toward the use of technology for teaching?
  - a. What are educators' attitudes toward the use of instructional technology for teaching?
  - b. What are educators' attitudes toward the use of web-based technologies for teaching?
2. What are educators' perceived usefulness and perceived ease of use technology for teaching?
3. Is there a statistically significant relationship between educators' attitudes toward instructional and web-based technologies, perceived usefulness, and perceived ease of use?

### **Method**

The researchers employed a mixed-method research approach emphasizing explanatory sequential design (Creswell, 2012). In this section, researchers describe the population and sample, instrumentation, and procedures used for data collection.

## **Population and Sample**

This study was conducted in five federal colleges of education located within seven states in Nigeria's northwest geopolitical zones. The population involves all teacher educators in these five colleges, namely: Federal College of Education, A; Federal College of Education, B; Federal College of Education, C; Federal College of Education-Technical, D; and Federal College of Education, E). Letters A, B, C, D, and E are used to conceal the names of the institutions. Within these colleges, there are a total of 2099 teacher educators. Researchers adopted a proportionate sampling technique for quantitative samples and a volunteer sampling for qualitative samples (Creswell, 2012).

## **Data Collection Procedure**

Researchers used a self-developed survey and semi-structured interview protocol. Both instruments went through several revisions and finally underwent reliability and validity testing. For the survey, researchers conducted content and face validity testing, and later on reliability testing using Cronbach's alpha (Heale & Twycross, 2015). The Cronbach's alpha value for attitude scale ( $\alpha = .80$ ) and perceived usefulness and perceived ease of use of instructional and web-based technologies scale ( $\alpha = .71$ ) are within the acceptable range for internal consistency (Tavakol & Dennick, 2011). The interview protocol undergoes validity testing by faculty with varying degrees of technology expertise. Their independent feedback was incorporated and guided researchers to come up with the final version of the protocol that was used for the collection of qualitative data. Researchers sent email invitations for participation through administrators in five colleges. The administrators distributed the survey invitation to 100 educators randomly selected from their college's faculty list-serve. Except for the Federal College of Education, E, the administrators sent 200 email invitations because it is larger than the other four colleges. The survey was developed on Qualtrics.

## **Results**

Of the 600-sampled faculty across five colleges, 234 (71.5%) responded. Researchers conducted data clean-up and came up with 190 (58.1%) survey responses that were completed and considered for data analysis. A response rate of 58.1% (190) of the target sample of 327 was deemed pertinent. The researchers exported the survey data generated from Qualtrics to the Statistical Software for the Social Sciences (SPSS). In the survey, an item was created for participants to indicate their willingness to voluntarily participate in a semi-structured interview. Twenty participants indicated their interests, and researchers created a pool of ten participants, two from each college. This, therefore, sums up to ten interviewees for qualitative data. Qualitative data were analyzed using NVivo software.

In this section, researchers discuss the statistical procedures that were used to analyze data streams (quantitative and qualitative). Quantitative data was first analyzed, followed by the analysis of qualitative data. Results were organized following the sequence of research questions, and the qualitative results are presented to explain the quantitative findings.

*Educators' attitudes toward the use of instructional technology for teaching.* Research question 1 was designed to investigate teacher educators' attitudes toward the use of instructional and web-based technologies for teaching. Survey items three and seven explored educators' attitudes toward the use of instructional and web-based technologies for teaching.

Findings revealed that there was no significant difference regarding educators' attitudes toward the use of instructional and web-based technologies. Survey item three explored educators' attitudes toward the use of instructional technologies for teaching in Nigerian teacher preparation programs. Table 1 shows the summary of results obtained for this item.

Table 1. Educators' Attitudes toward the Use of Instructional Technology

Attitude	Strongly disagreed <u>n (%)</u>	Disagree <u>n (%)</u>	Somewhat disagree <u>n (%)</u>	Neither agree nor disagree <u>n (%)</u>	Somewhat agree <u>n (%)</u>	Agree <u>n (%)</u>	Strongly Agree <u>n (%)</u>
<b>Instructional Technologies</b>							
Good	103 (54.2)	69 (36.0)	--	--	--	2 (1.1)	16 (8.4)
Unimportant	96 (50.5)	93 (48.9)	--	--	--	--	1 (.5)
Hard	58 (30.5)	130 (68.4)	--	--	--	1 (.5)	1 (.5)
Engaging	--	2 (1.1)	--	155 (81.6)	--	22 (11.6)	11 (5.8)
Inefficient	184 (96.8)	4 (2.1)	--	--	--	1 (.5)	1 (.5)
Useless	20 (10.5)	170 (89.5)	--	--	--	--	--

Table 1 shows that while the majority of educators disagree/strongly disagree that the use of instructional technology for teaching is good ( $n = 172, 90.2\%$ ), only a few agree/strongly agree that the use of instructional technology is good ( $n = 18, 9.5\%$ ). The majority of educators strongly disagree/disagree that the use of instructional technology is unimportant ( $n = 189, 99.4\%$ ). A large number of educators were neutral about their position on the engaging nature of instructional technology ( $n = 155, 81.6\%$ ).

Educators' attitudes toward the use of web-based technologies for teaching. Survey item seven explored educators' attitudes toward the use of web-based technologies for teaching in Nigerian teacher preparation programs. Table 2 presents the results which show that there was a little difference in educators' use of web-based technologies for teaching when compared to the use of instructional technology.

Table 2 shows that the majority of educators agree/strongly agree that the use of web-based technologies for teaching is good ( $n = 187, 98.4\%$ ), only one educator indicated that the use of web-based technologies is not good. The majority of educators strongly disagree/disagree that the use of web-based technologies is unimportant ( $n = 188, 99.1\%$ ). Many educators ( $n = 169, 88.9\%$ ) were neutral regarding their position on whether web-based technologies are engaging.

Table 2. Educators' Attitudes toward the Use of Web-Based Technologies

Attitude	Strongly disagreed <u>n (%)</u>	Disagree  <u>n (%)</u>	Somewhat disagree <u>n (%)</u>	Neither agree nor disagree <u>n (%)</u>	Somewhat agree <u>n (%)</u>	Agree  <u>n (%)</u>	Strongly Agree <u>n (%)</u>
<b>Web-Based Technologies</b>							
Good	1 (.5)	--	--	--	--	170 (89.5)	17 (8.9)
Unimportant	22 (11.6)	166 (87.5)	--	--	--	--	1 (.5)
Hard	10 (5.3)	10 (5.3)	--	3 (1.6)	--	128 (67.4)	37 (5.8)
Engaging	--	--	--	169 (88.9)	--	9 (4.7)	11 (5.8)
Inefficient	183 (96.3)	5 (2.6)	--	--	--	--	--
Useless	184 (96.8)	5 (2.6)	--	--	--	--	--

Qualitative data generated from the interview protocol corresponding to research question one indicates that educators have a very high positive attitude towards the use of technology for teaching. However, they are more inclined to use web-based technologies for teaching. For this item, researchers develop the following code from a generic coding method: Administrators' positive attitudes to technology, Administrators' negative attitudes to technology, Faculty's positive attitudes to technology, and Faculty's negative attitudes to technology. From these codes, researchers generated 23 meaning units, with varying degrees of the number of mentions (frequency) for each code. Overall findings from this item have shown that the majority of educators interviewed have positive attitudes toward technology in general ( $n = 9$ ). For example, an interviewee mentioned that,

I have a very positive attitude towards technology. I go to the extra length to learn more ways of integrating technologies for teaching. I learned about technologies that we don't even have available in our college. And also encourage my colleagues to learn as well. (Interviewee 10).

Item 2b of the interview protocol explored educators' comfort level regarding the use of instructional and web-based technologies. Findings have shown that while half of the educators interviewed expressed that they are very comfortable using both instructional and web-based technologies for teaching ( $n = 5$ ), and four ( $n = 4$ ) were comfortable; only one ( $n = 1$ ) educator indicated a lack of comfort using technology for teaching. This interviewee said, "Something that you may not have access to, you may not be comfortable with" (Interviewee 6).

Interviewee 3 explained that "I have a very positive attitude towards technology. There are certain things that you will likely get from technology use, which ordinarily you cannot get. I am very positive about using technology and I am enjoying it." Overall, educators indicated that they are ready, passionate, and always willing to learn how to use technology for teaching despite little support from administrators. Only one interviewee commented on the faculty's negative attitudes. He said, "They (faculty) don't want to because it requires a lot of preparation to be able to use, teach using technologies" (Interviewee 1).



A follow-up question was asked during the interview to all the participants regarding administrators' attitudes toward technology. The majority of educators interviewed indicated that administrators show negative attitudes toward technology use across all the colleges. They based their judgment on administrators' lack of commitment to provide access to the technology required in schools, there was not enough support and encouragement especially since there was not enough technology professional development for educators. Some interviewees pointed out that "Lecturers have positive attitudes, but administrators have negative attitudes. They just provide some of these technologies, and they don't care" (Interviewee 9). Likewise, another interviewee explained,

Administrators do not even provide us with technical support. Even if you write or forward a request, they hardly get back to you. Their words are always; school is running out of budget. But they will make a provision for it when forwarding another budget. This is where politics come in. I better not go into this. (Interviewee 1)

Of the ten educators interviewed (two from each college) only one pointed to administrators' positive attitudes to technology as positive. The interviewee discussed, "There is a lot of improvement in this regard [technology integration]. Administrators [in my school] are doing a little better [now] due to government dedication and plan to equip our education sector with technology" (Interviewee 5).

*Educators' perceived usefulness and perceived ease of use technology for teaching.* Research question 2 explored the overall educators' perceived usefulness and perceived ease of use technology from the viewpoint of the Technology Acceptance Model (TAM). Exploring educators' perceived usefulness and perceived ease of use of technology is very necessary for this study because educators' understanding of the perceived usefulness and perceived ease of use of any technology will define their attitudes toward accepting or rejecting that technology. Findings have shown that educators expressed positive attitudes toward their perceived usefulness of technology for teaching. Table 3 presents the mean and standard deviation distribution for this item.

Table 3. Faculty Perceived Usefulness of Technology

Statement	M	SD
It is useful to my students	4.69	.473
It enhances my ability to deliver content effectively	4.20	.411
It improves students' computer skills	4.15	.475
It improves students' ability to engage in research	4.11	.471
It improves students' ability to develop their collaboration skills	4.05	.337
It improves my productivity and efficiency in general	4.01	.424
It enables me to model student-centered strategies	3.38	.631

Table 3 shows that while scores clustered around the mean for a vast majority of items, there was variability in terms of educators' response to the item "It enables me to model student-centered strategies." This item had the lowest mean score and highest standard deviation ( $M = 3.38$ ,  $SD = .631$ ). A high sense of neutrality was observed on this item, "it is useful to my students," ( $M = 4.69$ ,  $SD = .473$ ).

Similarly, educators expressed positive attitudes toward perceived ease of use of technology. Findings have shown high mean scores for six items under this category, except for the item "It requires few steps possible to accomplish what I want to do with it in my teaching" ( $M = 4.02$ ,  $SD = .358$ ). Table 4 presents the result obtained for this item.

Table 4. Faculty Perceived Ease of Use of Technology

Statement	M	SD
I can recover from my mistakes quickly	4.77	.522
It is user-friendly	4.74	.547
I can use it successfully every time	4.18	.505
It is easy/simple to use	4.10	.541
I have the skills and competency to use it	4.06	.352
It is easy for my students to use	4.02	.358
It requires the fewest steps possible to accomplish what I want to do with it in my teaching	3.31	.522

Item 2c of the interview protocol explored educators' technology experience. From responses obtained, a total of nine meaning units were generated from two codes created: Positive Experience and Negative Experience. Findings have shown that the majority of faculty ( $n = 6$ ) expressed positive experience with technology. For example, one interviewee said, "I have had many positive experiences. My students comment that they like and enjoy what and how I am experimenting and pushing them to learn and use technology" (Interviewee 5). Another interviewee said,

I am using technology to teach and give assignments to my students. I give them assignments to be submitted online. I have web pages and blogs that I get my grading scale for grading my students. It is a very good experience. I also create a class page where I post grades on Google Documents, share documents. I love it. (Interviewee 9)

Subsequently, three ( $n = 3$ ) educators explained having negative experiences with technology. For example, one interviewee said,

Some of my students don't have access to these technologies. They don't even have a good cell phone that they can use to access the internet. This made me get bored sometimes. Also, I do double work. Teach students how to learn and use these technologies and teach content at the same time. (Interviewee 1)

Similarly, interviewee 5 explains "Sometimes I feel, I am doing more than required because you don't have positive support from administrators."

A follow-up open-question was asked that relates to educators' negative experience in using technology for teaching- what are the barriers that prevent you from using technology for teaching? From this item, researchers obtained a total of forty-eight meaning units related to educators' barriers to technology integration from five codes created (lack of technology competence, lack of access to technology, overcrowded classrooms, lack of stable electricity, and poor internet connectivity). Researchers used a generic coding method to analyze data generated and categorized it into two broad categories as institutional-based barriers and faculty-based barriers.

Table 5 presents barriers identified by educators interviewed and the number of times each barrier is mentioned by educators interviewed.

Table 5. Barriers to Educators' Use of Technology for Teaching

Categories	Barriers	Reference by Sources	f
1. Institutional Based	Lack of stable electricity/power supply	9	20
	Lack of access to technology	8	12
	Poor Internet connectivity	5	7
	Overcrowded classrooms	4	4
2. Faculty-Based	Lack of technology competence	3	5

As evident from Table 5, almost all interviewees ( $n = 9$ ,  $f = 20$ ) indicated that the “lack of stable electric/power supply” was a major barrier to their technology use. For example, one interviewee said, “the big issue is electricity is not available at any time. So even if you plan to use any technology, this issue will cripple your efforts. You know our problem with electricity, it is still there” (Interviewee 9). Other interviewees expressed similar concerns by indicating that “it made the use of web-based technologies more difficult” (Interviewee 2). Likewise, another interviewee pointed out that “the problem was one in Nigerian schools in general – lack of stable electricity” and explained that attempts are being made to change this. An interviewee said, “some of our new lecture halls, actually they are equipped with a standby generator as an alternative power supply” (Interviewee 8).

Data generated helped to explain why lack of or inadequate access is a key barrier to educators' use of technology for teaching. Eight of the ten interviewees made 12 comments related to “lack of access to technology.” They explained that technology access to technology varies across colleges and that there is inadequate access to instructional and web-based technologies needed to facilitate instruction. For example, one interviewee said, “Absence of most of the tools. I mean technologies. We don't have enough access to the majority of technologies” (Interviewee 6).

Poor internet connectivity is another barrier that was identified by five interviewees. In five comments, some interviewees described the depth of the problem. One interviewee explained, “We also have internet connection in the IT centers and library, here it is a strong connection. But around the college, in the classroom areas, we have it, but it is very weak or too poor” (Interviewee 2). However, Interviewee 4 said, “We don't have a reliable Internet connection.”

Educators highlighted students' overpopulation as one of the barriers that prevent them from using technology for teaching. Four educators interviewed made four comments about how this high number impeded their efforts to integrate technology into teaching. For example, one educator explained,

Sometimes also, the student population is an obstacle. We have classes that have over 300 students, for example, everyone in the School of Education knows this, also in the School of Languages. So, with this large number of students, this is a big obstacle. (Interviewee 8)

Educators have developed some strategies to address the problem of overcrowded classrooms. One educator said, “Roughly we have about 250 or more students in a class. So, you have to divide them into sections to be able to teach. Too much work on lecturer’s side” (Interview 2). Nevertheless, the large number of students in the classroom remains a barrier to educators' use of technology for teaching.

Technology competency plays an important role in determining educators' use of technology for teaching. Three educators made five comments about, “lack of technology competence” as a barrier to technology utilization. They explained that a lack of technology competence had prevented them from utilizing instructional and web-based technologies for teaching. One educator said, “Knowledge (competence) is another factor that prevents the use of technology. It is not everyone who is good at it” (Interviewee 2). Another educator elaborates on his colleagues’ competence by saying, “I will tell you not all lecturers are using technology because they do not have knowledge. They don’t have the competence that is required” (Interviewee 5).

*Relationship between educators’ attitudes toward instructional and web-based technologies, perceived usefulness, and perceived ease of use of technology.* Research question 3 explored the relationship between educators' attitude, perceived ease usefulness, perceived ease of use, and technology used for teaching. Survey items three and seven explored educators' attitudes toward instructional and web-based technologies, and survey items 11 and 12 examined educators' perceived usefulness and perceived ease of use of technology. Data were collected using a five-point Likert scale (strongly disagree, disagree, neither agree nor disagree, agree and strongly agree). To analyze these items, researchers computed and created scales for educators' technology attitudes, perceived usefulness, and perceived ease of use. Survey items three and four were merged to create an instructional technology attitudes scale (Inst\_Att\_Scale), and survey items seven and eight to create a web-based technology attitudes scale (Web\_Att\_Scale). Researchers conducted similar procedures described above and created scales for educators' perceived usefulness of technology (PU\_Scale) and perceived ease of use (PEU\_Scale).

To examine the relationship between educators' attitudes, perceived usefulness, and perceived ease of use and technology use and answer research question 3, researchers ran Pearson’s product-moment correlation coefficient. Table 6 presents means, standards deviations, and correlations for educators' attitudes toward instructional and web-based technologies, perceived usefulness, and perceived ease of use.

Table 6. Correlations for Educators’ Attitudes, PU, and PEU of Technologies

Variables	M	SD	1	2	3	4
1 Inst_Att_Scale	11.14	1.86	1.0	-.207**	-.175*	-.008
2 Web_Att_Scale	15.10	.630		1.0	.204**	.002
3 PEU_Scale	29.2	1.75			1.0	.624**
4 PU_Scale	28.6	1.77				1.0

\*\**. p < .01 two-tailed. \* p < .05 two-tailed*

Table 6 shows that there was a strong positive correlation between educators’ perceived ease of use of technology and perceived usefulness ( $r = .624, n = 185, p < .01$ ). Moreover, there was a small positive correlation between

educators' perceived ease of use and attitudes toward web-based technologies ( $r = .204$ ,  $n = 184$ ,  $p < .05$ ). There was a small negative correlation between survey respondents' attitudes toward instructional and web-based technologies ( $r = -.207$ ,  $n = 186$ ,  $p < .01$ ). Likewise, there was a small negative correlation between survey respondents' perceived ease of use and attitude towards instructional technology ( $r = -.175$ ,  $n = 188$ ,  $p < .01$ ).

## **Discussion**

In this study, researchers examined educators' attitudes toward technology integration and relationships between educators' perceived usefulness and perceived ease of use of technology. The review of related literature revealed that there was extensive literature addressing different topics in technology integration around the world. Findings from this study arrived from analysis of both quantitative and qualitative data and pointed some implications for educators, administrators, and stakeholders in education. In this section, researchers present a discussion of findings related to research questions.

Researchers have conducted extensive studies that explore how educators' technology attitudes affect technology integration across the various level of education. In several contexts, they report that educators' positive attitudes toward technology determine to a larger extent the degree of technology acceptance and use for teaching (Hassad, 2013; Loague et al., 2018; Marzilli et al., 2014). In Nigerian, literature has shown that technology utilization is in early stages across all levels of education (Garba et al., 2013; Owolabi et al., 2013). Findings in this study correspond with findings from various studies related to educator attitudes toward technology integration for teaching. For example, Marzilli et al. (2014) report that educators' positive attitudes toward technology have influenced their decision for utilization and adoption of technology for teaching. Correspondingly, Hassad (2013) found that faculty in higher education have a moderate attitude toward technology integration and there was a statistically significant correlation between educators' moderate attitude and technology acceptance and utilization for teaching. Findings from this study have shown that educators exhibit a positive attitude toward technology integration for teaching. The majority of educators agreed that the use of technologies (both instructional and web-based) for teaching is important. The qualitative findings substantiate the quantitative findings across the five colleges. Educators' positive attitudes could be ascribed to their passion for learning beyond the four walls of schools by attending technology professional developments in various avenues to improve their teaching in twenty-first-century education. Conversely, among ten educators interviewed, one educator indicated that educators exhibit a negative attitude toward technology. In line with this, some educators explain some barriers that may have to interfere with technology integration but did not deter their positive attitudes toward technology integration.

Researchers in various fields have used one or more components of the Technology Acceptance Model (TAM) to study the interplay of various factors determining technology acceptance (Echeng, et al, 2013; Fathema, et al, 2015; Holden and Karsh, 2010; Park, 2009). In educational settings, Alharbi and Drew (2014) report a strong positive correlation between educators' attitudes, perceived ease of use, perceived usefulness, and behavioral intentions to use a specific Learning Management System (LMS). In Nigeria, Echeng et al. (2013) suggest that educators' perceived usefulness and perceived ease of use define educators' behavioral intentions to accept and

use technology for teaching. Findings in this study also corroborated several research findings presented in the literature. We found a strong positive correlation between Nigerian teacher educators' perceived ease of use and perceived usefulness of technology which later informed their behavioral intentions to adopt and use the available technology for teaching. These findings elaborate more on educators' overall positive attitudes toward the integration of technology into teaching as reported in this study and other studies pointed out in the literature.

### **Implications for Educators and Stakeholders**

Educators' attitudes toward technology determine to a greater extent its utilization for teaching. In this study, findings suggest that educators' positive attitudes toward the perceived usefulness and ease of use of technology determine their attitude toward the use of technology. The overall findings from the study revealed that educators' attitudes toward the use of technology were moderate. They accept and use the available instructional and web-based technologies for teaching.

### **Educators**

There is a critical need for educators to develop interests to learn how to use different instructional and web-based technologies for teaching. This would enable educators to form positive attitudes toward technology and may influence their decision in accepting to use instructional and web-based technologies for teaching. While accepting technology is not enough, educators should also dedicate time for some technology professional development. This could be done through attending conferences, workshops, and seminars related to developing technology competence.

It is equally important for educators to help one another by forming a Professional Learning Networks (PLN) which can be departmental or college wide. Where they can engage in reading books related to technology integration and best practices related to the use of technology across disciplines. Another key area to focus on is the use of Open Educational Resources (OER). Educators should learn to make use of OERs as they provide free cutting-edge practices and resources for educators to enhance their Technological and Pedagogical Knowledge (TPK) for effective teaching in twenty-first-century classrooms.

### **Administrators**

Administrators across Nigerian teacher preparation colleges can play an important role in helping educators to accept and use technology for teaching. Administrators should work to provide enormous access to technology within the colleges and set some technology support centers (IT Support Centers) within each college. These centers should aim to provide educators and students with on-time technical support whenever the need arises. Administrators should also work to provide some technology professional development workshops and seminars for educators across all colleges. This could be done by inviting experts in the field of technology integration as guest speakers, keynote speakers, and even providing hands-on workshops for educators.

## **Directions for Future Research and Recommendations**

This study examined the relationship between educators' attitudes, perceived usefulness, and perceived ease of use of instructional and web-based technologies and we found that educators exhibit a degree of positive attitudes toward the use of technology for teaching. Similarly, there was a strong positive relationship between perceived usefulness and ease of use of technology which later influence their behavioral intentions to use technology for teaching. Based on findings from this study, we recommend that researchers in Nigeria should consider the following as directions for future research:

1. Researchers should conduct a large-scale nationwide study to examine educators' technological and pedagogical knowledge that will enable them to make sound suggestions to administrators on areas of technology professional development.
2. Researchers should conduct a study to explore educators' technology comfort level and how it impacts their technology integration.
3. Researchers should also conduct a study that explores educators' technology needs. Knowledge of that will enable both administrators to provide technical support services across Nigerian campuses.
4. Researchers should conduct a large-scale global literature review on the impact of technology attitudes, perceived ease of use, and perceived usefulness of technology. Identify some research that stand out and replicate them in the context of Nigerian educators.

## **Conclusion**

The education during the COVID-19 pandemic experience has shown that technology has a special place in education. More than before, we learned that technology integration serves as a means that grants many people education access (Fu, 2013). Onyia and Onyia (2011) opine that technology-enhanced education could promote the acquisition of knowledge and skills leading to creating lifelong learners. Educators across all levels of education should learn how to integrate technology effectively to enhance their teaching. It is, therefore, imperative for educators to have positive attitudes toward technology integration and develop behavioral intentions to use it for teaching. The purpose of this study was to use Davis et al. (1989) Technology Acceptance Model (TAM) and examine Nigerian teacher educators' attitudes and use of instructional and web-based technologies in teacher preparation programs. TAM helped the researchers to describe the process involved in technology acceptance and adoption for teaching. Among other things, findings have shown that Nigerian teacher educators exhibit overall positive attitudes toward the use of instructional and web-based technologies for teaching. Similarly, findings revealed that there was a strong positive correlation between educators' technology attitudes, perceived usefulness, and perceived ease of use of technology which later translate to educators' behavioral intentions to accept and adopt technology for teaching. There is a need for educators and administrators to work together to make technology integration seamless to maximize students learning.

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