UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY MODEL AS A PREDICTOR OF PRE-SERVICE TEACHERS' INTENTION TO TEACH WITH TECHNOLOGY IN SOUTHWESTERN NIGERIA

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DEDICATION

The work is committed to Almighty Allah for His innumerable blessings and divine protection throughout my studies. It is also dedicated to my late grandmother, Alhaja Shifau Atunwa. May Allah be pleased with her soul and grant her the best of Jannah.

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ABSTRACT

Teachers' intention to teach with technology is fundamental to the integration of technology in the teaching-learning process. Reports have shown that the intention to deploy technologies in teaching among pre-service teachers in southwestern Nigeria is poor. Previous studies have focused more on the availability and utilisation of technology in teaching than on extending Unified Theory of Acceptance and Use of Technology (UTAUT) and Technology Acceptance Model. This study was, therefore, conducted to extend the UTAUT Model comprising Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI) and Facilitating Conditions (FC) with Technology Familiarity (TF), Technological Anxiety (TA), Attitude to Technology Use (ATT) and Accessibility to Technological Resources (ACC), with a view to examining pre-service teachers' intention to teach with technology in southwestern Nigeria.

The study was premised on the UTAUT Model, while the explanatory sequential mixed methods design was adopted. In stage one, a preliminary investigation was carried out with 36 students from a College of Education (COE) and 23 from a university to explore other factors that were germane to teachers' intention to teach with technology than UTAUT variables. The factors were TF, TA, ATT and ACC which were loaded high upon subjection to Factor Analysis. In stage two, a new model was built to examine UTAUT variables with its extension on pre-service teachers' intention to teach with technology. Six public universities and COEs were randomly selected from southwestern Nigeria. Part-three students in COEs and 400-level undergraduates were purposively selected, having had teaching practice experience and acquired micro-teaching skills. They were 1,333 students and 985 undergraduates. The instruments used were PE (r=0.8), EE (r=0.7), SI (r=0.7), FC (r=0.8), TF (r=0.9), TA (r=0.8), ATT (r=0.8), ACC (r=0.8) and Behavioural Intention (BI) (r=0.7) scales. Focus group discussions (12) were held with pre-service teachers. Quantitative data were subjected to Pearson product moment correlation and Partial least square structural equation modelling at $p \leq 0.05$, while qualitative data were content-analysed.

Pre-service teachers' BI was sufficiently predicted by the combination of (PE, β =0.08); (EE, β =0.10); (FC, β =0.11); (TA, β= -0.37); (ATT, β =0.20); and (ACC, β =0.12). The extended UTAUT model jointly accounted for 52.0% of the variance observed in pre-service teachers' BI. The most important construct in the prediction of pre-service teachers' BI was TA (0.10). There was a significant direct causal effect of ATT (r =0.25); EE (r =0.09); PE (r =0.06); ACC (r=0.14) and FC (r =0.09) on BI, but not on SI and TF. There was a significant negative causal effect of TA (r= -0.29) on BI. The pre-service teachers' BI was invariant of the tertiary institution type. The model predicted other factors than the original UTAUT model. There were complaints by the pre-service teachers about technological know-how and accessibility to technological tools.

The extended Unified Theory of Acceptance and use of Technology model enhanced the prediction of pre-service teachers' intention to deploy technology in teaching in southwestern Nigeria.

Keywords: Pre-service teachers, Extended UTAUT model, Behavioural intention, Classroom activities

Word count: 482

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LIST OF ABBREVIATIONS

SLP: School Location Preference

CSP: Classroom Size Preference

TF: Technology Familiarity

TA: Technological Anxiety

ATT: Attitude towards Technology Use

ACC: Accessibility to Technological Resources

PE: Performance Expectancy

EE: Effort Expectancy

SI: Social Influence

FC: Facilitating Condition

EXP: Experience

VU: Voluntariness of Use of Technology

BI: Behavioural Intention

FGD: Focus Group Discussion

PIG: Preliminary Investigation Group

PIG 1: Preliminary Investigation Group Consisting College of Education Students

PIG 2: Preliminary investigation Group Consisting University Students

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Across the globe, education is experiencing a number of reforms. The purpose of these reforms is to allow educational stakeholders to perform their responsibilities more efficiently. As a result, students will be equipped with the necessary skills and knowledge to deal with the ever-increasing challenges of the modern world. The systematic inclusion of information and communication technologies (ICTs) into the educational system at all levels is one of the pillars of these changes. Information and communication technologies (ICTs) have been hailed as potentially transformative tools for educational transformation (Lawal, 2008; Yusuf and Yusuf, 2009; Mbachu and Hamilton-Ekeke, 2013; Nleya, 2016). Different learning-supported technologies help improve educational access, strengthen the relevance of education in an increasingly digital workplace, and raise educational quality by making teaching and learning an enjoyable exercise when utilised effectively (Yusuf and Yusuf, 2009; Aremu and Fasan, 2011; United Nations Educational, Scientific and Cultural Organization, 2015). The rapid development and extensive adoption of technology in education have been well recognised at all levels of education over the previous two decades (David and Silin, 2017; Maisamari, Adikwu, Ogwuche and Ikwoche, 2018).

The integration of technology into the classroom has dramatically changed how instruction is presented to students across different categories (Paul-Juinn, 2013; Hartman, Townsend, and Jackson, 2019). Hence, studies on technology integration in education indicate a promising future for education if properly used (Butzin, 2001; Aremu and Fasan, 2011; Abimbade and Adedoja, 2015). However, despite the pivotal role of technology in enhancing instructional delivery, incorporating digital tools into classroom activities in Nigeria has been occurring at a relatively slow rate, when compared with other countries (Okyere-Kwakye, Md Nor and Ologbo, 2016: Akinde and Adetimirin, 2017).

According to studies on technology integration in Nigeria, teachers' acceptance of technology is still at a low rate due to several factors like teachers' attitude, lack of motivation and insufficient training of teachers, among others (Eseani and Ishaq, 2013;

Emmanuel, Chiaka and Edna, 2014; Akinde and Adetimirin, 2017)). According to Mormah, and Bassey (2019) the reluctance to use technology in the classroom is due to lack of computer, lack of time, technical difficulties, poor funding, resistance to change, poor administrative support, low levels of computer literacy, technology misaligned with the curriculum, lack of incentives, poor training opportunities and lack of vision as to how to integrate technology into learning processes and teacher related difficulties such as negative attitudes, belief and unwillingness towards technology.

At every level of school, teachers are expected to demonstrate a high degree of technology acceptance through the integration process. Teachers at all levels of education are expected to play a vital role in promoting and implementing technology in teaching, as well as learning. Scholars have continuously advocated the necessity to investigate variables that cause instructors' aversion to using technology for teaching and learning, according to evidence in the literature. Jones (2004), for example, ascribed the barriers to technology acceptance in teaching and learning in the United Kingdom to a lack of technical assistance, teachers' lack of confidence, and a lack of understanding of the benefits of employing technology in their teaching. Lim and Khine (2006) and Courtney, Miller and Gisondo (2022) discovered that teachers' use of technology in the classroom remains peripheral and minimal, and that teachers do not use technology properly and successfully in Singapore.

The problems confronting the efficient use of technology for classroom instruction in Africa most especially in Nigeria are immense, such as epileptic power supply, inadequate training of teachers, and the inadequate supply of technology equipment, among others (Mandoga, Matswetu, and Mhishi, 2013). Except for computer studies, Emmanuel, Chiaka, and Edna (2014) found that technology is not integrated into other educational disciplines in the curriculum. Technology cannot be maximised for effective teaching and learning when teachers do not use it for teaching as expected.

Teachers' adoption of technology remains the most important determinant of increased students' performance in knowledge acquisition and skill development. (North Central Regional Educational Laboratory, 2002; Oye, Iahad, Noorminshah and Madar and AbdRahim 2012; Olibie and Ezenwanne, 2013; Awosejo, Ajala and Agunbiade, 2014; Adubi, 2018). With governments' little investment in technology for learning, especially in the developing countries, it is necessary to assess teachers'

technological acceptability so that these efforts will not translate to a sheer waste of national resources (Abbasi, 2011).

Investing in technology in the education industry without first determining how people accept it could amount to resource wastage. Due to increased interest in integrating technology into classroom settings, the technology acceptability issue has also occupied a key place in literature (Aypay, Çelik, Aypay and Sever, 2012; Murtala and Norazrena, 2019; Bello and Hamzat, 2020). Technologies must first be approved by pre-service and in-service teachers before contemplating training them to use technology to promote learning. (Wong, 2015). However, this study did take into account pre-service teachers.

Pre-service teachers are student teachers undergoing teacher's training at higher education institutions in order to become professional teachers. This category of teachers has not undertaken any teaching job and has little or no knowledge about teaching. They are yet to complete requirements for full certification (Chand, Alasa, Chitiyo, and Pietrantoni (2022). Due to pivotal roles played by teachers in the teaching-learning process, teachers' preparation programmes are strategic in achieving sustainable education at all levels. One of the most significant duties in faculties of education, according to Akinsola (2014), is the process of training, preparing, and providing pre-service teachers with basic teaching skills. One of the basic skills is the ability to teach with technology, which begins with technology acceptance and the intention to teach with technology.

To promote effective technology integration at all levels of education, several theoretical models have been developed to predict and explain aspects that influence teachers' acceptance and intention to utilise technology in the classroom. Some of these models are: Technology Acceptance Model (TAM) (Davis, 1989; Davis, Bagozzi and Warshaw, 1992), Innovation Diffusion Theory (IDT) (Rogers, 1983), the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975) the Motivation Model (MM) (Davis, Bagozzi, and Warshaw, 1992) the Theory of Planned Behavior (TPB) (Ajzen, 1991); the Combined TAM and TPB (Taylor and Todd, 1995); the Model of PC Utilisation (MPCU) (Thompson, Higgins and Howell, 1991; Triandis, 1977); Social Cognitive Theory (Bandura, 1986; Compeau and, Higgins, 1995; Compeau, Higgins and Huff, 1999) and the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh, Morris, Davis, and Davis (2003). The Technology Acceptance Model (TAM) was created to predict and investigate aspects that may

influence computer usage behaviour (Davis et al., 1989; Straub, Keil and Brenner, 1997; Venkatesh and Davis, 2000; Yuen and Ma, 2002).

In other words, TAM has become the basic framework from which other models like TAM II, TAM III and UTAUT have emanated to predict the computer usage behaviour of individuals. However, as good and acceptable as these theories are, they tend to form clusters of usage, with little crossover across clusters (Lim, Saldanha, Malladi and Melville, 2013). Therefore, there is the need for an extension of the theory to suit regions with restricted access to modern information and communication technology like Nigeria. To understand pre-service teachers' intention to teach with technology in South-West Nigeria, this study used the Unified Theory of Acceptance and Use of Technology (UTAUT) model proposed by Venkatesh, Morris, Davis, and Davis (2003). Past studies (Al-Qeisi, 2009; Oye *et al* 2012; Mbete and Raisamo, 2014; Alkhasawneh and Alanazy, 2015) have shown that the model has advantages over other technology acceptance models as per its efficacy of prediction, robustness, and validity with regard to new technological innovations.

Performance expectancy, effort expectancy, social influence, and facilitating conditions are the four essential constructs of the UTAUT model. These elements have impact on people's intentions to use technology. These UTAUT components and definitions were altered for use in this study's technology acceptance environment. The degree to which the use of technology will aid customers in executing specific activities is referred to as performance expectancy. According to studies, teachers would be motivated to employ technology in the classroom if they subjectively believed that adopting a technological tool would help them execute their work better in any manner (Venkatesh and Davis, 2000; Mahmood and Swanberg, 2001; Bui, 2022).

Performance expectancy has been shown to be a powerful predictor of a person's desire to use technology to complete tasks in a variety of fields. According to Venkatesh *et al*. (2003) and Alblooshi and Abdulhamid (2022), performance expectancy is the degree to which a person believes that using an information system will help him or her achieve better job performance. Adapting performance expectancy to the instructional process, then, implies that in-service and pre-service teachers should integrate technology in a systematic way to ensure a successful teaching-learning process.

It could also indicate that teachers will consider technology to be beneficial if the tools help them to accomplish instructional objectives in the classroom. It relates to the users' belief that using the information system will help them perform better at work.

In other words, if pre-service teachers consider digital technologies to be useful and advantageous to effective classroom activities, they will employ them in their future classroom practices. As a result, this construct remains important for assessing teachers' intentions to use technology to offer instruction at all levels of education.

The degree of easiness connected with consumers' usage of technology is referred to as effort expectancy (Venkatesh *et al*, 2003) According to the UTAUT model, effort expectancy is the belief that individual acceptance of technology will depend on whether or not the accessibility of technology is easy and effortless. This construct refers to the easiness that a person or teacher considers when considering technology use, particularly for instructional purposes. Venkatesh (2012) has organised three sub-dimensions from previous texts, specifically from existing technological acceptance models. "Consciousness of ease of use" (TAM/TAM2), "systematic complexity" (MPCU), and "operating simplicity" (IDT) are the three sub-dimensions. This means that one of the key factors in accepting information technology is whether the design of the information system allows the user to use it easily or not. For example, if the operation of a cell phone function is straightforward and easy to understand, and whether it is simple for a user to use 3G/4G mobile telecommunication to access the Internet are all variables that decide whether a system is simple to use or not.

The extent to which customers believe that persons (such as families and friends) believe they should utilise a specific technology is referred to as social influence. Individuals will plan to conduct behaviour when they judge it highly important and believe "others" think they should perform it, according to Ajzen and Fishbein (1980). The first three constructs or components (performance expectancy, effort expectancy, and social influence), as well as the fourth construct (facilitating conditions), are direct drivers of the intention to use technologies, according to Afonsoa, Roldánb, Sánchez-Francoc and Gonzalez (2012). According to previous studies, social influence has a big role in influencing one's desire to use new technologies (Moore and Benbasat, 1991; Venkatesh and Davis, 2000; Abu-Taieh, AlHadid, Masa'deh, Alkhawaldeh, Khwaldeh and Alrowwad, 2022).

The fourth construct found as a predictor of individual usage behavior across different kinds of human endeavor is the facilitating condition. It refers to an individual's level of assistance from an organization, as well as the availability of technically required equipment for system use. To capture this construct, Venkatesh *et al* (2003) organised three sub-dimensions from current technological acceptance

models. These are: "control of conscious behavior" (TPB/DTPB, C-TAMTPB), "promoting condition" (MPCU), and "compatibility" (IDT). Among them, "control of conscious behavior" refers to the user's self-efficacy to use the system in general, which is the user's assessment of whether or not they can operate the system; "promoting condition" refers to the objective environment's technology assistance; and "compatibility" is the consistency of system and organizational value.

As a result, a collaborating scenario occurs when the organizational and technological frameworks aid the user in using the system, such as through computer software and hardware support or systematic operation assistance (Venkatesh *et al* 2003). In other words, facilitating condition in instructional process implies the availability of organisational and technical support from education stakeholders to engender effective technology acceptance and use in the classroom. It indicates whether a teacher possesses personal knowledge and institutional resources to use technology in instructional delivery. These conditions could include Internet facilities, electricity supply and technical support from educational technology experts in the instructional setting.

The UTAUT model could aid in the prediction of technology usage across diverse user groups in various parts of the world. Venkatesh, Thong, and Xu (2016) and Komlan, Yongan, and Komi (2019) claim that the UTAUT model should be extended with new exogenous, endogenous, moderation, or outcome mechanisms due to the dynamic nature of society and developments in technological innovations around the world. The implication is that this model can stand the test of time only if it is extended by other variables peculiar to different regions of the world. In other words, there are compelling needs to domesticate the UTAUT model to increase its degree of predictability of technology use, particularly among the teachers.

Neufeld, Dong, and Higgins (2007), for example, looked at how charismatic leadership affected the four UTAUT characteristics that influenced behavioral intention and usage. Venkatesh, Thong, and Xu (2012) discovered four distinct types of UTAUT extensions after conducting a meta-analysis of the literature: new exogenous, endogenous, moderating, and outcome processes. For example, Neufeld et al. (2007) theorised and discovered that charismatic leadership influenced performance expectancy, effort expectancy, social influence, and enabling conditions positively. The impact of additional predictors on the two endogenous variables in UTAUT (behavioural intention and use behaviour) or the enrichment of the four exogenous

factors and the two endogenous variables in the original UTAUT are referred to as new endogenous mechanisms.

These extensions had been carried out in various parts of the world to ensure universality, as well as generalisation; but due to the disparity between demographics and regions with access to modern information and communications technology (ICT), and those who have limited or no access, this cannot be achieved evenly. Moreover, those extensions tend to form clusters of theory usage, with little crossover across clusters (Lim *et al,* 2013) As a result, a paradigm shift in UTAUT extensions, as well as research on technology acceptance and use in general, is required. In other words, the UTAUT model needs to be extended by indigenous endogenous and exogenous variables within the context of the Nigerian educational system. To examine additional contributions of the current UTAUT in literature, the theoretical concept of contextualisation was used (Hong, Chan, Thong, Chasalow and Dhillon, 2014).

The contextualisation approach was chosen not only because the context has emerged as one of the most important theoretical lenses in the field of information systems (Hong, Chan, Thong James, and Dhillon, 2014), but also because existing UTAUT research has explicitly or implicitly mentioned "new contexts" as one of the major research contributions. This implies that the UTAUT model allows researchers to extend the framework by adding other endogenous or exogenous or moderator variables that could ensure universality and project the model within the context of different educational systems across the globe (Afonsoa, Roldánb, Sánchez-Francoc and Gonzalez, 2012; Adubi, 2018). This might be because factors responsible for technology integration could vary across the world. Teachers in Europe, America, Australia and most of Asia have adopted the effective use of technology in the classroom (López-Pérez, Pérez-López, Rodríguez-Ariza and Argente-Linares, 2013). However, the acceptance and adoption of technology for education by teachers in Nigeria and most of Africa are not at their best, due to several global and domestic causes (Ubulom, Enyekit and Onuekwa, 2011; Mbaba and Shema, 2012).

Nigeria, South Africa, and the rest of Africa's developing countries respect the contributions of digital tools to educational progress and teacher preparation. However, studies by Awosejo *et al* (2014) and Musa, Mahmud, and Jalil (2018) found that, due to socioeconomic and technological obstacles, technology was not widely adopted in many higher education institutions in the African region. While data on technological acceptability from developed countries and other emerging civilisations was plentiful

(Zhang, Gao and Ge, 2013), perspectives from Africa (Nigeria and South Africa inclusive) are scarce (Ojiako, Chipulu, Maguire, Akinyemi and Johnson, 2012; Arekete, Ifinedo and Akinnuwesi, 2014; Okyere-Kwakye, Md Nor and Ologbo, 2016; Moodley, Callaghan, Fraser and Graham 2021).

It should be noted that factors and parameters to measure technology acceptance are context specific and could not be generalised across different countries. In order to achieve universality and generalisability of the UTAUT model across continents, there is the need to extend the UTAUT model with local factors to suit the Nigerian educational context. To do this, the researcher conducted a baseline study to identify the potential local elements that would influence teachers' intentions to use technology in the classroom in this part of the world. Fifty-nine pre-service teachers from a university and a college of education in southwest Nigeria were chosen at random. The college was selected from Lagos State, while the university was from Oyo State. The qualitative responses of the participants were transcribed and thematically analysed (see Chapter 3). The findings showed that pre-service teachers identified technology familiarity, technological anxiety, teachers' attitude towards technology, and availability and accessibility to technological resources as major factors that could encourage or discourage their intention to teach with technology in the classroom (Researcher, 2018).

In the light of this, the UTAUT model was extended by those locally generated factors that were evident from the baseline study. This, then, led to developing a practicable model that is workable and applicable to the context of the Nigerian educational setting. To explain teachers' technology use behaviour, most study papers on technology usage among teachers focused on performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh *et al.*, 2003; Oye *et al.*, 2012). Other studies (Davis, 1989; Davis, *et al.*, 1992) looked at perceived usefulness, perceived ease of use, subjective norm, and behavioural intention. At different levels of schooling, little or no attention has been paid to the role of socio-demographic, psychological, and technological aspects in predicting the intention to utilise technology. Therefore, this study extended the UTAUT model with technology familiarity, technological anxiety, attitude towards technology usage and accessibility to technological resources, and determined the impact on the intention of pre-service teachers to teach with technology. It should be noted that "Availability of Technological Resources" is not included in the extension because the availability of technological

resources is already embedded in "Facilitating Conditions" in the original UTAUT model.

Studies have been conducted in different contexts on these factors (technology familiarity, technological anxiety, teacher's attitudes towards technology use, and access to technology) by scholars worldwide. Palak and Walls (2009), Sad and Özhan (2012), Ghavifekr, and Rosdy (2015), Ben, Dahmani, and Ragni, (2022) submitted that technology familiarity is crucial for educators and that poor familiarity can be a barrier to technology-based intervention and limit the use of technological tools. Students' knowledge with technology is influenced by their access to it, the reason for which it is used, and their attitudes towards it (Thompson and Bortoli, 2007). Teachers must be conversant with the type of technology they wish to utilise in the classroom, which can be accomplished only if they have access to these technologies. A low level of familiarity with technological tools could influence the rate of technological anxiety among users. Teachers' reluctance to adopt and integrate technology tools into their instruction has been attributed to a number of factors, including fear of failure, computer anxiety, and a lack of technological competence (Balanskat, Blamire and Kafal, 2007).

Hong, Chan-Jer, Chien-Yun, Ming-Yueh, Pei-Hsin, and Lee (2012) concluded that technology adoption increases as technological anxiety decreases. Also, Buabeng-Andoh (2012) asserted that technology can transform learning in and outside the classroom. Still, the attitudes of pre-service teachers to technology plays a key role in their acceptance of it. Teachers who used computers at home and had computer experience were less anxious and had more positive attitudes towards technology than those who had less experience. It should be noted that the rate of technological anxiety could influence teachers' attitudes to use technology tools for instructional delivery. Teachers must have unlimited access to the available digital tools inside educational settings for any technology integration effort to be successful. Lack of access to technology resources, according to Land and Hannaffin (2000), can prevent full exploitation of technology. Technology access and utilization are dynamic assets in effective education.

These four new constructs were identified as strategic factors that could determine teachers' technology use intentions. However, it is important to emphasise that the original UTAUT components may also be seen in teachers' attitudes towards the use of technology in teaching and learning in the Nigerian educational system. In

other words, the reports from the baseline study corroborated the roles of the original UTAUT constructs in determining teachers' intention to use technology for instructional delivery. For instance, prospective teachers asserted that teaching with technology reduces stress, aids recall, and makes the teaching-learning process effective. This backs up Venkatesh *et al.* (2003); Dull (2019) and Kaisara, Atiku and Bwalya, (2022) that performance expectancy is still an important factor to consider when deciding whether or not to adopt technology.

Similarly, most pre-service teachers intend to use technology to teach, according to the baseline survey, since they believe that using technology reduces teachers' stress if they can effectively operate technological tools. They affirm that the stress associated with operating technological tools could affect technology use in their future classrooms (Researcher, 2018). This is consistent with the original UTAUT model's effort expectancy. Also, the pre-service teachers believed that organisations, parents, and relatives need to encourage students to use technology by providing technological tools and organisational support necessary for effective technology use. This statement affirms facilitating conditions in the original UTAUT constructs, and it is taken into account in this study as accessibility to technological resources.

Conditions that facilitate and discourage the inclination to use technology were also identified in the baseline study. Pre-service teachers believed that learners' age, school location and environment, large classroom size, availability of technological infrastructure, constant power supply, and technological know-how could stimulate technology use in the classroom (see Chapter Three). Furthermore, conditions that discourage the intention to use technology to teach could include financial constraints, lack of infrastructure, fear, misuse of technology by students, small class size, location of the school, and poor maintenance of equipment (Researcher, 2018). It should be noted that some of these assertions from the pre-service teachers are not embedded in the original UTAUT model. As a result, the UTAUT model must be expanded to accommodate the unique characteristics of Nigerian society. It is, therefore, logical to extend the UTAUT constructs with indigenous parameters to create a culturally responsive teaching pedagogy at all levels of education. With technology's pervasive effect in the education sector, identifying indigenous factors from the teachers will stimulate productive discussions on the future of technology in instructional settings.

The recent advancement in technology innovations such as mobile technology, interactive whiteboard, digital storytelling and others, rapidly transforms work culture

(UNESCO, 2011a). It is impossible for teachers to look away from the fact that today's classrooms must provide technology-supported learning in order to actively engage students in the teaching-learning process. Thus, a teacher's professional practice must include being prepared to adopt and use technology, as well as understanding how technology can support student learning. As a result, pre-service teachers were included in this research because they are the future of technology use in the classroom.

According to Obiefuna and Offorma (2014), pre-service teachers are the future teachers who are expected to take over the leadership and management of school teaching upon graduation. Several factors could moderate their intention to teach with technology, and the original UTAUT model indicated that age, gender, experience, and the willingness to utilise technology could play significant roles in moderating the technology used in the classroom. Many researchers have investigated the pivotal role of gender in technology acceptance and use among people in society. Previous studies indicated that gender significantly influences technology adoption and usage in an organisational context (Venkatesh et al., 2000; Venkatesh and Morris, 2000; Luo *et al*., 2010; Venkatesh *et al*., 2012; Villarroel-Molina; De-Pablos-Heredero, Barba, Rangel, and García, 2022). According to Nysveen *et al*. (2005) and OECD Report (2018) men have a higher proportion of perceived utility of mobile commerce than women, and peer evaluations have a greater impact on females than males in mobile services.

Another moderator variable that is closely related to gender is age. Teachers' age could be a strong factor to be considered when examining the use of technology in instructional delivery. Previous research had revealed evidence that age has a moderating effect on behavioural intention and technology use. In their study, Venkatesh *et al*. (2000) found out that the majority age group adopting computers in the USA is 15–17 years, followed by a group of 26–35 years. Age moderated the connections between performance expectancy, social influence, and individual intention (Yu, 2012). The age of the user is also related to the experience in using technology to execute a task.

The UTAUT model also emphasised the importance of technology use being voluntary. The users of any digital tool should have the freedom to decide either to use the device in executing a task or adopt an alternative tool. Voluntariness of use is the degree to which innovation use is viewed as being from one's own choice, consent or of free will (Moore and Benbasat, 1991). Thus, it was discovered that the voluntariness of use influenced the user's decision to utilise technology to some extent. This may have

an impact on teachers' usage of digital tools in the delivery of instruction. Aside from these four moderator variables in the original UTAUT model, scholars have used computer self-efficacy, technology self-efficacy, technical support, and others to moderate the use of technology by teachers in the classroom.

School location choice and classroom size preference, on the other hand, were identified as relevant characteristics that could influence the intention to utilise technology in the baseline study and were, thus, used as moderator variables in this study. The school location preference, where pre-service teachers would practise in the future, could determine whether or not technology would be used for instructional activities. In this part of the world, there seems to be a concentration of infrastructural facilities in the urban centres at the expense of the rural areas. This could affect teachers' accessibility to technological resources. In other words, teachers in urban areas tend to have access to a variety of digital tools, and this could influence their familiarity with technology, technological anxiety, and attitudes towards technology use.

According to Hafkin (2002), Internet access is frequently available only in the capital and secondary schools of many developing countries' cities, whereas the majority of people live outside of these cities. This makes school location an important variable to be considered in technology use at all levels of education. The location of the school could also determine the class size in the instructional process. The future classroom size choice could be a major influence in motivating instructors to employ technology in their classrooms. This refers to the number of students a prospective teacher desires in future classroom practices.

In other words, it is the preferred class size a pre-service teacher intends to have in his/her future classroom that would make him or her utilise technology in the teaching-learning process. In an attempt to solve problems associated with large class size, teachers and other educational stakeholders could use technology to reach many students simultaneously. While class size is yet to be settled in literature, it appears that the experience and decision-making process of teachers and students vary with varied class sizes (Gibbs and Jenkins, 1992). According to Ahmed and Arends-Kuenning (2006), increasing student numbers without corresponding increases in personnel and classroom resources will lower teaching and learning quality. This situation may encourage teachers to take advantage of technology's potential for conveying material to a large group of students at once. Given this, school location and classroom size were used as moderator variables for the study.

The intention to use was chosen as the dependent variable in this study because of its strong connection to actual behaviour. Behavioural intention (BI) is a measure of how hard someone is willing to try to exhibit a specific behaviour (Ajzen, 1991). In this study, using the intention to use as a dependent variable has practical advantages because access to information on actual technology use in schools may be too sensitive and, thus, discourage schools from participating. Furthermore, when asked to describe their actual technology use, such as the number of hours spent or lessons taught using a computer, teachers may respond in a socially desirable manner; a circumstance in which participants reply in ways that they believe the researcher desires.

Tella, Toyobo, Adika, and Adeyinka (2007) discovered that teachers' intentions to use computers drive their utilization, and that perceived usefulness is likewise highly linked to those intentions. When compared to actual use, which is more static and retroactive, the intention to use is more progressive as a dependent variable (Yi, Jackson, Park and Probst, 2006; Raza, Qazi, Khan, and Salam 2021; Abu-Taieh, AlHadid, Alkhawaldeh, Khwaldeh, Masa'deh, Alrowwad and Al-Eidie, 2022). These prospective teachers are still in training, and it will be more appropriate to measure their level of preparedness and skills acquisition to use technology by examining their intention to utilise technological devices in future classroom practices. This study, therefore, extends the unified theory of acceptance and use of technology model to predict the intention of pre-service teachers in universities and colleges of education in southwest Nigeria to utilise technology to teach.

1.2 Statement of the Problem

As technology continues to impact positively on teaching and learning, teachers' rate of technology acceptance becomes a strategic factor that could influence technology use at all levels of education. In most cases, the success or otherwise of technology use amongst classroom teachers is partly a function of teachers' technology acceptance in the instructional process. Previous research had focused on using variables that had been tested in technology acceptance models to investigate teachers' intentions to adopt technology across countries. Perceived ease of use, perceived usefulness, facilitating condition, effort expectancy, and performance expectancy are only a few of the variables.

However, factors identified in these technology acceptance models cannot be generalised to all regions of the world due to peculiar characteristics of different

countries across the globe. In other words, factors that aid or hinder technology acceptance and the intention to teach with technology in developed countries might not be the pre-determining factors in developing countries, including Nigeria. There seems to be a paucity of research in this aspect of technology use, especially in Nigeria. Hence, each of the countries could be identified with some locally generated factors that could affect technology use at various levels of education. Thus, the purpose of this research is to look into the factors that influence technology acceptance and the intentions of teachers to use technology for instructional delivery in Nigeria.

Therefore, the study extends the UTAUT model with such variables: technology familiarity, technological anxiety, attitude towards technology, and accessibility to technological resources to determine the influence on pre-service teachers' intention to teach with technology in southwestern Nigeria. The effect of school location, age, gender, experience, voluntariness of use, and classroom size as moderators were investigated.

1.3 Objectives of the Study

The main purpose of this research is to investigate the extent to which the extension of the UTAUT model with such variables like technology familiarity, technological anxiety, attitude towards technology, and accessibility to technological resources will determine the intention of pre-service teachers to teach with technology in their future classroom teachings. The moderating effect of school location, age, gender, experience and classroom size were also examined. The specific objectives of this study were to:

1. Examine the consistency level of the hypothesised extended UTAUT model consisting of Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Condition (FC), Technology Familiarity (TF), Technological Anxiety (TA), Attitude toward Technology (ATT), Accessibility to Technological Resources (ACC) and other moderating effects of gender, age, experience, voluntariness of use, school location, and classroom size.
2. Determine the most meaningful model that best describes the extended UTAUT model
3. Determine the relative importance of the exogenous variables (independent variables) to predict pre-service teachers' intention to use technology for teaching (dependent variable) based on the validated UTAUT model.

4. Examine the direct effect of independent variables: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Condition (FC), Technology Familiarity (TF), Technological Anxiety (TA), Attitude toward Technology (ATT), Accessibility to Technological Resources (ACC) on dependent variable (pre-service teachers' intention to teach with technology).
5. Examine the effect of moderating factors such as voluntariness to use technology, experience in the use of technological devices, future classroom size preference, gender, age and future school location preference on pre-service teachers' intention to use technology for classroom instruction.
6. To determine whether there is variation in the level of intention of the pre-service teachers from colleges of education and those from the universities with reference to the validated extended UTAUT model.

1.4 Research Questions

RQ_1: How consistent is the hypothesised extended UTAUT model consisting of: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI) Facilitating Condition (FC), Technology Familiarity (TF), Technological Anxiety (TA) Attitude towards Technology (ATT), Accessibility to Technological Resources (ACC) and Moderating effect of gender, age, year of technology usage, school location preference, classroom size preference, voluntariness to use technology and intention to use technology for teaching (BI) with the empirical data?

RQ_2: What is the most meaningful model describing the extended UTAUT model?

RQ_3: How much variance does the exogenous variables accounted for in the criterion variable in the extended UTAUT model variables?

RQ_4: What is the relative effect of the exogenous variables in the prediction of the intention of pre-service teachers to utilise technology for teaching based on the validated UTAUT model?

RQ_5: To what extent do age, gender, voluntariness to use technology, future classroom size preference, future school location preference and experience in the use of technology moderate the effect of the individual exogenous variables on the intention of pre-service teachers to utilise technology for teaching?

RQ_6: How variant is the validated extended UTAUT model with respect to university and college of education?

1.5 Significance of the Study

Studies have revealed that the acquisition of digital tools does not necessarily translate into effective use of technology for instructional delivery. Thus, findings from this study would provide useful information on the factors to be considered to improve student-teachers' technology acceptance for classroom activities. Therefore, this study would be a good platform to measure the behavioural intention of pre-service teachers to use technology in the classroom. This would empower educators to provide pre-service teachers with the necessary skills and encourage a favourable attitude towards using technology in their future workplaces.

The study is expected to provide educational stakeholders with a policy framework that could examine factors that could encourage or discourage the intention of pre-service teachers to utilise technology for future classroom engagement. This would allow stakeholders to consider these variables in all ICT formulation and implementation strategies on pre-service teachers' behavioural intention to use technology. Professional Association would be guided on factors that would be considered while developing individual as a professional member, thus, encourages pre-service teachers on the usage of technology for effective and efficient service delivery.

The study would provide information to teacher educators on the factors to be considered while developing teachers' ability to use technology and their intention The study would also encourage the school administrators to provide schools with technological equipment and to make it accessible to teachers. Findings from this study would also be beneficial in the social and intellectual development of individuals, local communities, and national communities, in the sense that if the technology is eventually accepted and used by teachers, there will be student-centred learning, problem-solving skills, cooperative learning, and higher-order thinking on the part of the learners. If technology is incorporated into teaching and learning, students will be able to learn faster and better. The study would also add to studies about the application of the UTAUT model in an educational environment.

1.6 Scope of the Study

This study extends the UTAUT model by variables like technology familiarity, technological anxiety, teachers' attitude towards technology use, and accessibility to technological resources. The moderating influence of age, gender, experience, school

location preference, classroom size preference and voluntariness to use technology was also examined in the study. The essence of the study is to predict the intention of pre-service teachers to teach with technology in southwest Nigeria. The study covered six states in southwest Nigeria: Lagos, Ogun, Oyo, Ekiti, Ondo, and Osun. One university and one college of education were selected from each state, totalling six universities and six colleges of education altogether for the study. The study is further restricted to only the final year pre-service teachers from the selected universities and colleges of education respectively, due to the experience they had in teaching practice exercise and in technology usage.

1.7 Operational Definition of Terms

The following terms are defined and used:

Accessibility to Technological Resources/Equipment: This is the ability of pre-service teachers to get and use technological tools when needed. The accessibility to technological resources scale used for this study was developed by the researcher. It contains eight items and was meant to measure how pre-service teachers' ability to obtain and use technological resources could determine their intention to teach with technology.

Age: This is the length of time that the pre-service teachers have lived or have being in existence.

Attitude towards Technology: This refers to pre-service teachers' overall affective reaction or disposition towards using technology to teach in the future. The attitude towards technology scale for this study was adapted from the computer attitude scale (CAS) developed by Selwyn (1997). It was designed to assess pre-service teachers' views about technology use, their beliefs about using technology in their work, and their perceived comfort level or difficulties with technology.

Classroom size Preference: This is the number of learners pre-service teachers could have in their future classrooms, which could prompt them to use technology for instructional delivery.

Effort Expectancy: This is the degree to which pre-service teachers can use technology in the classroom with ease. Effort expectancy for this study was assessed using a scale derived from the original UTAUT constructs' scale. The effort expectancy scale for this study contains seven items.

Experience: This is a general concept comprising pre-service teachers' knowledge of technology or skills obtained through involvement in technology usage or exposure to technology.

Facilitating Condition: This refers to the level of support that pre-service teachers enjoy from organisations or schools and availability of technically relevant equipment towards system use. The scale with which facilitating condition for this study was measured was adopted from the original UTAUT scale.

Focus Group Discussion Guide: Focus group discussion questions for the pre-service teachers were developed by the researcher. It contains three-item interview questions, ranging from whether pre-service teachers think using technology for instructional delivery could help them achieve instructional objectives in their future classroom and whether pre-service teachers intend to teach with technologies in their future classrooms and to state the reason(s) for their answer(s).

ICT Facilities: These refer to the available set of physical resources like computers, projectors, iPads, Internet facilities, et cetera., that could encourage pre-service teachers in universities and colleges of education to use technology to carry out their teaching activities in future.

Indigenous Factors: These are factors or constructs generated by the pre-service teachers in college of education and university as factors that could prompt their intention to teach with technology in their future classrooms.

Information and Communication Technologies (ICTs): They are the digital tools, software, machine, equipment, devices and apparatus, either using manual, photographic, optical mechanical, electrical, electrostatic or electronic principles or combination of such principles, that are primarily intended for recording and/or processing and/or monitoring and/or transmission of voice and/or data and/or image and/ or text or any combination thereof that could be used by prospective teachers in the colleges of education and universities in southwest Nigeria to facilitate instruction in the classroom.

Intention to use Technology: This is the aim or plan that teachers-in-training in the universities and colleges of education have to use technological tools in future classroom practices. The intention to use technology scale used for this study contains ten items which was adopted from the work of Hartshorne and Ajjan (2009), who used a survey to examine students' decisions to adopt web 2.0 technologies.

Performance Expectancy: This is the degree to which the use of technology will benefit pre-service teachers in performing their teaching activities. The performance expectancy scale for this study was adopted from the original UTAUT constructs' scale, The essence of this scale is to measure the degree to which the use of technology could help pre-service teachers in the performance of their jobs.

Pre-service Teachers: Students in universities and colleges of education who are being trained to become effective and prospective teachers.

School Location Preference: This refers to where pre-service teachers prefer their schools to be located in order for them to teach with technology in future classroom practices.

School: This refers to the stratification or division of students in colleges of education based on their departments.

Social Influence: This is the degree to which pre-service teachers perceive that important others (such as family, friends, school authority, et cetera.) believed they should utilise technology to teach in the classroom. The social influence scale for this study was adopted from the original UTAUT constructs' scale to measure how important others (family, friends, school authority, et cetera) could motivate pre-service teachers to teach with technology in their future classrooms.

Technological Anxiety: This is the fear usually entertained by pre-service teachers in their intention to use technology to teach or participate in computer-related activities as measured by an instrument. The technological anxiety scale used for this study was adopted from the computer anxiety scale by Heinssen, Glass, and Knight (1987). It was meant to measure the degree to which the usage of technology could arouse fear and unfavourable feelings among pre-service teachers.

Technology Acceptance Model (TAM): This is a framework that shows the factors that could encourage or discourage the acceptance of technology by pre-service teachers in the colleges of education and universities.

Technology Acceptance: This is the level at which the pre-service teachers in colleges of education and universities are willing to accept the use of technological tools in their future classroom practices.

Technology Familiarity: This is the level of competence and capabilities in the technology usage possessed by pre-service teachers. The technology familiarity scale for the study was designed by the researcher to measure how competent and capable the pre-service teachers are in the use of technology.

Technology: This refers to any technological tool or platform that pre-service teachers can utilise to enhance teaching and learning in the classroom.

Unified Theory of Acceptance and Use of Technology (UTAUT): This is a technology acceptance model formulated by Venkatesh, Morris, Davis and Davis (2003) to explain "pre-service teachers' intentions to use information systems and subsequent usage behaviour towards a unified view.''

Voluntariness of use: This is the extent to which the use of technology by pre-service teachers is perceived as being by choice, self-determining or of free will.

CHAPTER TWO
LITERATURE REVIEW

This chapter was reviewed under four sub-headings: theoretical framework, conceptual review, empirical review and an appraisal of the literature.

2.1 Theoretical Review

2.1.1 The Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) introduced by Davis (1986), is one of the most widely used models to explain user acceptance behavior. Technology Acceptance Model (TAM) was developed from the Theory of Reason Action (TRA), in order to describe an individual's information technology (IT) acceptance behaviour. This model is grounded in social psychology theory in general and the Theory of Reasoned Action (TRA) in particular (Fishbein, & Azjen, 1975). It assumes that when users perceive that a type of technology is useful and also easy to use, they will be willing to use it. Consequently, the more employees recognise that the systems will make their tasks easier to perform; the higher is the probability that they will use it and accept the new technology as being useful (Dillon & Morris, 1996). TRA asserts that beliefs influence attitudes, which lead to intentions and therefore generate behavior. Correspondingly, Davis (1986, 1989) introduced the constructs in the original TAM as follows: perceived usefulness (PU), perceived ease of use (PEOU), attitude, and behavioral intention to use. Among the constructs, PU and PEOU form an end-user's beliefs on a technology and therefore predict his or her attitude toward the technology, which in turn predicts its acceptance.

TAM has become well-known as a robust, powerful, and parsimonious model for predicting user acceptance (Venkatesh & Davis, 2000). The objective of TAM is to examine why users' attitudes and beliefs influence their acceptance or rejection of IT. TAM aims to provide an explanation of the determinants of the adoption and use of IT. Davis (1989) developed the TAM, which is based on the TRA, to understand the causal relationships among users' internal beliefs, attitudes, and intentions as well as to predict and explain acceptance of computer technology (Davis et al., 1989). Behavioral intention is determined by both the user's attitude and its perception of usefulness. The

user's attitude is considered to be significantly influenced by two key beliefs, perceived usefulness (PU) and perceived ease of use (PEOU), and that these beliefs act as mediators between external variables and intention to use. TAM theorises that an individual's behavioural intention to use a system is determined by PU and PEOU.

Perceived Ease of Use (PEOU) refer to the degree to which a user expects use of a system or technology to be free from efforts (Davis, 1989). TAM consists of two salient values: perceived simplicity of use and perceived effectiveness. Davis (1989) posits that, PEOU and perceived usefulness have a direct effect on behavioral intention. The predictive energy of perceived simplicity of use and perceived effectiveness for users' technology acceptance continues to be empirically confirmed by many studies. Mathieson (1991) compared TAM and TPB and each of this theory is talking about behavioural intention of users of IT. He found that both predict behavioural intention and confirmed Davis' TAM findings. Barki and Hartwick (1994) compares TRA and TAM in 1994 using undergraduate students. They confirmed that TAM predicted behaviour while showing how subjective norms made a difference in behaviour.

Perceived Usefulness (PU) Perceived usefulness (PU) refer to a user's subjective probability that using a different system or technology will increase his or her job performance (Davis, 1989). Taylar and Todd (1995) compared Theory of Planned Behaviour (TPB) and TAM in 1995. TAM was found to be parsimonious and solid predictor of behaviour. However, they found that self–efficacy and subjective norms also affect behaviour. Davis (1989) conducted numerous experiments to validate TAM by using PEOU and PU as two independent variables and system usage as the dependent variable. He found that PU was significantly correlated with both self-reported current usage and self-predicted future usage. PEOU was also significantly correlated with current usage and future usage. Overall, he found that PU had a significantly greater correlation with system usage than did PEOU. Further regression analysis suggested that PEOU might be an antecedent of PU rather than a direct determinant of system usage. That is, PEOU affects technology acceptance (TA) indirectly through PU.

Although many studies have increased the popularity of the TAM model, Chandio et al. indicated that this model is insufficient to explain users' adoption and use of new technology especially in the context of e-government (Chandio, Burfat, Abro, and Naqvi, 2017). Furthermore, one of the argument and criticism of the TAM model is the notion that the model could explain individual behavior. However, it was

reported that the Technology Alignment Model is not robust enough to explain user's behavior about buying, rejecting or accepting to use technology (Hai and Alam Kazmi, 2015).The behavior of users, which is inevitably evaluated through subjective means such as behavioral intention (BI) such as interpersonal influence.

Nevertheless, interpersonal influence as the subjective norm is explained to mean when a person is influenced by words of mouth from a colleague, or a friend. While a superior can influence employee by directing a subordinate to perform a specific task with the use of technology, based on their IT policy, but a friend has no directive influence over staff who is a subject to the line manager. Another limitation is that, underlines of behaviour cannot be reliably quantified in an empirical investigation, owing to a number of different subjective factors such as the norms and values of societies and personal attributes and personality traits. Hence, the argument that a relative, friends could influence the use of technology through exacting social pressure (Ang, Ramayah and Amin, 2015; Shan and King, 2015) is highly falsifiable. Although it may be true in theory or for personal use of technology, the conceptualization may not be plausible or accurate in a work environment.

2.1.2 Unified Theory of Acceptance and Use of Technology (UTAUT) Model

After analysing and integrating the elements of eight prior models that earlier academics had used to describe information system usage behaviour, Venkatesh, Morris, Davis, and Davis (2003) presented the Unified Theory of Acceptance and Use of Technology (UTAUT) model. The eight prior models are: the Technology Acceptance Model (TAM) (Davis, 1989; Davis, Bagozzi and Warshaw, 1989), Innovation Diffusion Theory (IDT) (Rogers, 1983), the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975) the Motivation Model (MM) (Davis, Bagozzi, and Warshaw, 1992) the Theory of Planned Behavior (TPB) (Ajzen, 1991); the Combined TAM and TPB (Taylor and Todd, 1995); the Model of PC Utilisation (MPCU) (Thompson, Higgins and Howell, 1991; Triandis, 1977); and Social Cognitive Theory (Bandura, 1986; Compeau and Higgins, 1995; Compeau, Higgins and Huff, 1999). The UTAUT was later validated in a longitudinal study and found to account for seventy percent of the variance in usage intention (Venkatesh et al., 2003). As a result, the UTAUT model for information system adoption is broad, strong, and powerful.

Since its inception, the UTAUT model has been extensively applied and tested for predicting system usage and making technology-adoption and technology-usage-

related decisions in a variety of fields, including interactive whiteboards (Šumak and Šorgo, 2016), near-field communication technology (Khalilzadeh, Ozturk and Bilgihan 2017), mobile health (Hoque and Sarwar, 2017), home telehealth services (Cimperman et al., 2016), and acceptance of Enterprise Resource Planning (ERP) software (Chauhan and Jaiswal, 2016).

The UTAUT model was presented in a paper published in MIS, quarterly, as an extension of the technology acceptance model. It was created to bring together past TAM-related research. In the UTAUT, four fundamental components determine user intent to utilise an information system and subsequent usage behaviour: performance expectancy, effort expectancy, social influence, and facilitating conditions. Age, gender, experience, and voluntariness to use technology, according to the UTAUT, may modify these dimensions. For male and younger workers, the intensity of the relationship between performance expectancy and the intention to use, for example, may vary dramatically with age and gender. The UTAUT model, according to Venkatesh et al. (2003), accounted for seventy percent of the variance in usage intention. Much research that used the UTAUT, on the other hand, has mostly concentrated on huge corporations in the business world.

The UTAUT is also used to better understand the factors that influence acceptance so that proactive interventions can be developed for groups of users who are less likely to embrace and use new systems. Individual acceptance research has evolved, thanks to the UTAUT model, which unifies widely held theoretical perspectives and incorporates four moderators to account for dynamic effects such as organizational environment, user experience, and demographic characteristics (Venkatesh et al., 2003). According to Oshlyansky Cairns and Thimbleby (2007), the UTAUT tool may be beneficial in revealing cross-cultural disparities in technology acceptance. While reviewing the UTAUT model, Wang, Li, Wang, Liu, Deng and Wang (2022) stated that the UTAUT was considered the most prominent and unified model in information technology adoption research, with high robustness of the instruments for the core constructs. In comparison to other technological acceptance and usage theories, Dulle and Minishi-Majanja (2011) concur that the UTAUT is comprehensive and has strong explanatory power. This model's ability to be extended makes it an appropriate framework for use in a variety of educational situations.

The UTAUT model allows researchers to expand the framework by including additional factors that assure universality and project the model into the context of other

educational systems around the world. This is due to the fact that the factors that influence technology integration may differ from country to country. Instructors in Europe, America, Australia, and much of Asia have embraced the successful use of ICTs in the classroom (López-Pérez, 2013); however, in Nigeria and most of Africa, teachers are still grappling with outdated tools due to a variety of external and internal causes (Ubulom, Enyekit and Onuekwa, 2011; Mbaba and Shema, 2012). Despite the fact that the contributions of digital tools to educational development and teacher training are highly valued in Nigeria, South Africa, and the rest of Africa's developing countries, studies such as Awosejo, Ajala, and Agunbiade (2014) have revealed that, due to socio-economic and technological challenges, ICTs are not widely used in many African higher learning institutions.

Regardless of the fact that today's pre-service teachers are adept at using social and communication tools, recent research suggests that they are unprepared to integrate technology into their classes (Gill and Dalgarno, 2008; Lei, 2009). The ultimate purpose of any technology program is to impact pre-service teachers' abilities and intent to teach with technology in their classrooms. For this reason, Anderson and Maninger (2007) believe that elements connected with instructional use of technology should be considered first. Thus, in order to properly prepare pre-service teachers for 21st century classrooms, it is critical to understand the elements that contribute to, or impede, pre-service teachers' intentions to use technology.

Other elements have been added to the original UTAUT model to determine the desire to utilise technology, as well as actual use behaviour. Eckhardt, Laumer, and Weitzel (2009) added five dimensions to the social influence construct based on the source of the effect (that is, from the same department, from other operating departments, from the IT department, from the customers, and the suppliers). It should be highlighted that in the original UTAUT paradigm, conducive factors influence technology use behaviour rather than the intention to utilise technology. Although the adaptations of the model enriched the understanding of the theory applications, the research was mainly limited to organisational settings (Yi et al., 2006; Chang et al., 2007; Al-Gahtani, Hubona and Wang, 2007; Hong and Kang, 2011).

Evidence abounds in literature which shows the UTAUT theory lacked evidence about a user behavioural model, which could explain the utilisation of technology across different clusters (Lim, *et al* 2013). Hence, UTAUT is faced with the challenges of explaining behavioural intention in different settings most especially across different

regions. However, such evidence was important, given arguments in prior studies suggesting that the determinants of acceptance in organisational and non-organisational (consumer) settings are not the same. It was found that the importance of the factors reflecting the costs and benefits of behaviour varied based on the context (Brown & Venkatesh, 2005; van der Heijden, 2004; Brown, Venkatesh & Bala, 2006; Brown & Venkatesh, 2005; Kim, Malhotra & Narasimhan, 2005). The goal of this study is to assess pre-service teachers' intention to use technology for instructional delivery. Therefore, the original UTAUT model should include three exogenous variables to assess the intention to use technology: performance expectancy, effort expectancy, and social influence.

This means that, excluding facilitating conditions, the model will have three external and one endogenous construct. However, many pre-service teachers stated that the availability and accessibility of technological tools, along with organizational support, would impact their desire to utilise technology in the classroom at any level of education, according to the baseline survey report. As a result, one of the newly developed exogenous variables in the modified UTAUT model for the study is resource accessibility. Availability of technological resources and organizational support was already embedded in the original UTAUT model's facilitating condition; therefore, availability was not listed explicitly as a new variable. In order to prevent duplication of variables, it is counted as part of the facilitating conditions. In addition, prospective teachers' school location and classroom size preferences are deemed appropriate to moderate the desire to use technology in the classroom. This is because it was discovered in the baseline study that pre-service teachers' intention to use technology for the teaching-learning process is influenced by their school's locations and class sizes, regardless of other factors that influence their intention to use technology. Age, gender, experience, voluntariness of usage, future school location preference, and future classroom size preference were all moderator variables in the extended UTAUT model.

2.2 Conceptual Review

2.2.1 Rationales for using Models in Educational Practices

Generally, a model is a simplified depiction of a system that focuses attention on specific elements of the system (Ingham and Gilbert, 1991). A model allows complicated or abstract components of a system (e.g. processes, structure, objects,

events, ideas) to be rendered visible or more easily understood (Gilbert, 1995; Gobert and Buckley, 2000). Teachers can use learning models to organise their efforts in generating a conducive learning environment and arranging instructional activities. Learning models have an impact on what the teacher does, what the student performs, how the classroom is organised, what processes are used, what materials are used, and what instructional tasks are assigned.

The following are the main features of models, according to Penny (2001):

- **Plausibility:** The model appears to be based on facts and experience. The model is true to what we know, however limited that information may be; it is true as far as rational observation and experience are assessable.
- **Simplicity:** The model gives a representation or explanation that is as simple as possible, avoiding complexity. An excellent model is elegant in the sense that it expresses its meaning with the fewest possible words, figures, or concepts.
- **Explicitness:** The model is presented and articulated in plain, easy-to-understand language. It may readily be shared with others, allowing them to expand their knowledge and application.
- **Comprehensiveness:** A good model includes all of the facts and variables that are required for comprehension and application.
- **Limited:** The model includes only what is required and specifies where and to what degree it applies. The model's boundaries and demarcations are well defined.
- **Usefulness:** The model describes what is happening in order to produce, explain, or predict current and future action. An excellent model is both practical and valuable.
- **Testable:** The model gives concepts that may be tried out, verified, or discarded.
- **Aesthetic appeal:** The model is clear and attractive visually, verbally, and graphically. A good model is visually appealing or described in a compelling metaphor and is free of superfluous images or words.

This suggests that an indigenous model is necessary to comprehend the difficulties teachers face in properly incorporating technology into classroom activities in this region of the world. This will strengthen some investment made by governments at all levels and other educational players in the procurement of technical instruments.

As a result, an extended approach like this would go a long way toward streamlining the instructional process and strategically incorporating technology into the classroom.

2.2.2 The use of Technology to Facilitate Instructional Delivery

Technology, according to Hornby (2010) and Stošić (2015), is defined as scientific knowledge applied to the design of new machines and equipment in industries. Technology also refers to the alteration of the natural world in order to meet perceived human desires and demands (ITEA, 2000). Because human needs are insatiable, technology seeks to provide feasible solutions to the human demands that man craves in order to survive. As a result, teachers must make effective use of technology in order to foster innovative thinking, creativity, and research abilities in their students (Faizi, Shakil, and Sidra-tul-Muntaha, 2013; Laleye, 2015). The process of using scientific, material, and human resources to suit human demands is known as technology. The use of information to satisfy human wants or purposes is known as information and communications technology (ICT), which includes the use of modern equipment such as computers and the Internet. With the availability of vast amounts of information on the Internet, the introduction of ICT into education signalled a paradigm change, indicating the end of the teacher as the primary repository of knowledge.

ICT has great possibilities, according to Buabeng-Andoh (2012) and Anikweze and Kanu (2018), in sharing knowledge, making education more real, and establishing effective educational services. Information and communication technologies, according to Abolade and Yusuf (2005) and Onwuagboke, Singh, and Fook (2015), are essential tools in any educational system because they can be used to meet the learning needs of individual learners, support educational equality, provide high-quality learning materials, increase students' self-efficacy and learning independence, and improve teachers' professional development. The use of ICT in the classroom produces a more inclusive learning environment that encourages engagement and eliminates inactivity (Mikre, 2011). Similarly, Olorundare (2006) and Nwosu, Shaffe, and Nurzatul (2018) affirm that ICT is important in teaching and learning because it provides teachers with unrestricted access to relevant information and development in a subject area, as well as efficient and effective tools for dealing with students' differences.

Multimedia presentations, video teleconferencing and, more recently, web-based training are all examples of how educational institutions are increasing their usage and variety of technology. Teaching and learning applications are seen as the

wave of the future; they have a direct impact on present educational practices and regulations, and hence have the ability to change traditional concepts of education (Scardamalia and Bereiter, 2014; Okolije, 2016). Given the current state of technology use in education, teachers must understand the specific role of technology in order to properly cope with the pressures caused by continuous innovation in educational technology and tensions to prioritise the use of technology. Though teachers are expected to believe the impact of technology on students' learning, they may or may not accept technology due to personal factors such as computer efficacy (Gong, Xu, and Yu, 2004), technical factors such as the availability of constant electricity supply (Thong, Hong, and Tam, 2002), and environmental factors such as facilitating conditions (Ngai, Poon and Chan, 2007). As a result, understanding teachers' acceptance of technology necessitates an investigation of the elements that influence teachers' acceptance of technology.

The use of technology in the classroom in the twenty-first century is critical, and teachers at all levels of education must embrace this technological transformation. Teachers are still under-performing in their use of technology in classrooms, according to Kay (2006), despite the easily available technologies for instructional use and regulations for teacher technology proficiency. According to the United States Department of Education's Office of Technology, a new generation of learning tools, many of which are technology-based, is being developed in the modern world to answer the ever-increasing problems of current instructional contexts. Smartphones, for example, assist pupils in studying more effectively and frequently. Interactive whiteboards connect schools to the outside world and take the role of traditional chalkboards.

In most modern classrooms, you'll find iPads, laptops, and desktop computers. Teachers could connect students to social learning platforms such as wikis, blogs, discussion boards, live chats, or webinars once the hardware is in their hands. Skype, Animoto, Twitter, Dropbox, Google Earth, and YouTube are just a handful of the digital tools that might help make teaching more effective and engaging. There is no shortage of technological devices, software, or websites that could be used to improve students' learning experiences. Millions of dollars invested in technology, on the other hand, could be squandered if technology integration is not properly implemented. "Educational technology best practices have a significant positive impact on

improvements in student achievement and must be widely and consistently practised," Greaves, Hayes, Wilson, Gielniak, and Peterson (2010) wrote.

Students can access the Internet, resources, and information from anywhere and at any time using mobile technological devices such as cell phones, smartphones, tablets, pads, notebooks, and computers (Wang, 2007). Teachers and students can use academic and social applications such as a content management system for course study materials and Skype for peer-to-peer course discussions, thanks to advancements in mobile devices. Students and faculties can use mobile devices to access their lectures and other course group members via email, video networking, and new Internet-based resources (Donaldson, 2011). Users of m-learning interact with educational information resources while they are away from their usual learning environment, such as a classroom or a desktop computer. While traveling or working away from the university campus, mobile learning allows students and professors to manage their extra time to complete coursework or assignments (Virvou and Alepis, 2005; Kayode, Alabi, Sofoluwa, and Oduwaiye, 2018). All of this suggests that teachers at all levels of school could benefit from the use of various technological tools to improve instructional delivery.

2.2.3 Technology Acceptance among Nigerian Teachers

Effective instructional delivery encompasses all interactive social skills used by a teacher to encourage learning in the classroom setting, resulting in increased learner performance. It is a method in which teachers use a variety of instructional tactics to communicate and interact with students about academic content in order to increase student engagement and improve learning outcomes. Many institutions have adopted ICT, and large sums of money have been spent to computerise them. Some academics, however, claim that such large investments have little positive impact on learning effectiveness (Stool, 1999). This can be explained by the fact that teachers who are expected to use such technology do not receive any initial instruction on how to do so (Ojo, 2005; Jegede, 2009). It becomes a difficult situation for these teachers to acquire the skills and content that are embedded in ICT. As a result, it is necessary to include instructional models for using ICT in the classroom in the teacher education program (Haywood and Norman, 1988).

For a long time, technology acceptance has been a difficult issue in information systems research, and researchers have looked into a variety of topics relating to

technology acceptance, ranging from individual user characteristics like cognitive style to internal beliefs and their impact on user behaviour. Understanding why people embrace or reject technology is critical because it may be used as a guide for investors, manufacturers, and institutions, as well as for management intervention (Razep and Abel, 2014). Despite the necessity to deploy information technology resources for teaching and learning, data reveals that e-resources are rarely used in the classroom, particularly in less developed countries (Yusuf and Balogun, 2011). Nigeria has been mired in a crippling education crisis for more than two decades, with limited access to educational opportunities and resources, large class sizes, poor implementation of the planned curriculum, insufficient funding, poor management, a lack of interest in the learning process, a scarcity of qualified teachers, and a low level of literacy and basic education skills (Onasanya, Ayelaagbe and Laleye 2012). As a result, students' examination performance suffers, and they resort to cheating in order to improve their grades. The technique or method used by the teacher in teaching the concepts, the means of communication or his language of expression, the material or media used during the process, and the nature of the learners in the instructional setting all contribute to effective service delivery in educational training.

Pre-service teachers are typically uninterested in using technology, particularly Web 2.0 technology, in their teaching practice. Pre-service teachers have limited opportunity to integrate technology into their classrooms and build a proper awareness of the requirements and interests linked to technology integration (Yusuf and Balogun, 2011). People are driven by psychological fulfillment while participating in fascinating activities, according to Reeve (2009). Teacher educators should provide pre-service teachers with subjective experiences of feeling competent and an innate motivation for personal improvement in technology integration in the classroom, as part of their responsibilities. Despite the broad use of ICT for personal research, correspondence, and administrative chores reported among educators in Nigerian institutions, Akinde and Adetimirin (2017) assert that ICT integration for teaching in some of these universities' classrooms is low and delayed. This is due to the fact that incorporating ICT into the classroom is a complicated phenomenon that necessitates a grasp of educators' perspectives on teaching, learning, and technology.

The existing infrastructural resources for effective technology acceptance in most colleges of education and universities in this region of the world are woefully inadequate. Because of the high demand for Internet access on campus, it was

discovered that most university students still use the Internet off campus. The bandwidth shared on most of these cybercafé systems is still limited. As a result, a lot of time is still squandered on the Internet (Akinde and Adetimirin, 2017). According to Olaniyi (2006), the majority of Nigeria's higher education institutions have begun to construct ICT centers. Nonetheless, they concentrate solely on Internet services, ignoring the other elements that make up the ICT centre. The government, on the other hand, has not made ICT infrastructure a priority. Due to socioeconomic and technological factors, Sife, Lwoga, and Sanga (2007) contend that ICTs have not penetrated many higher learning institutions in many developing nations to a large extent. They discovered that employing these tools for academic purposes was weak, and they highlighted primary issues: personality traits, motivation, facilities, and computer knowledge. According to some studies (Capan, 2012; Sabzian and Gilakjani, 2013; Nwosu, Shaffe, and Nurzatul, 2018), low technology adoption is due to a lack of knowledge of user behavior, causing the focus to move from what consumers desire to what is technologically possible. While many innovative educators value and use technology, others are concerned that it may disrupt young people's participation in "conventional" education (Redecker, 2009; Njenga and Fourie, 2010).

2.2.4 Pre-Service Teachers' Education in Nigeria

Teachers play critical roles in the instructional process; hence, teacher preparation programs are critical for attaining long-term educational success at all levels. One of the most significant duties in education faculties is the process of preparing, training, and augmenting pre-service teachers with critical teaching skills (Akinsola, 2014). Teachers' training institutes, such as colleges of education, were developed to address the scarcity of teachers in Nigerian schools. Teacher education is a powerful instrument for improving educational outcomes (Akindutire and Ekundayo, 2012). This is why the Federal Government of Nigeria's National Policy on Education (NPE) has clear educational objectives. The following are the objectives, according to the Federal Republic of Nigeria (2004):

i. to develop classroom teachers who are highly motivated, conscientious, and effective at all levels of our educational system;
ii. to inspire teachers to pursue a spirit of inquiry and creativity;
iii. to assist teachers in integrating into the social life of their communities and society at large, as well as to strengthen their dedication to national goals;

iv. to give teachers the intellectual and professional basis necessary for their jobs, as well as to prepare them to adapt to any changing scenario, not just in their own country but around the world; and

v. to strengthen teachers' dedication to their profession.

The quality of teachers is determined by the processes that lead to their training for a professional role in today's classrooms. Quality teachers are critical to the success of any educational system and, to a greater extent, a nation's success. This is nicely represented in Oluremi (2013) and Straková's (2015) belief that the quality of any educational system is determined by the qualifications and competency of teachers. When it comes to teacher education in Nigeria, the work of the Phelps-Stokes and Ashby Commissions in 1925 and 1959, respectively, must not be overlooked. The Ashby Commission's recommendation resulted in the establishment of Advance Teachers College, which offers a two-year Grade I teacher training program (Afe, 2002). The two-year teacher's programme was eventually changed to a three-year programme in Colleges of Education, resulting in the award of the Nigerian Certificate in Education (NCE). This commission also suggested the establishment of a National Teacher Institute and the expansion of the country's university system. Teacher education is seen as a way of not only equipping teachers with the required skills and information to adequately carry out their teaching roles, but also for their professional progress in Nigeria, where the demand for well-qualified teachers has sparked a lot of interest in the profession (Osunde and Omoruyi, 2004).

Teacher education is a type of training that focuses on the art of teachers learning professional competencies and growing as individuals. It is a necessary practice that improves learning and teaching abilities. Teacher education is intended to generate highly motivated, sensitive, conscientious, and successful classroom teachers who will manage pupils effectively and professionally in order to improve educational outcomes (Ololube, 2005). According to Amedeker (2005), most teachers are unable to demonstrate adequate knowledge and understanding of the structure, function, and evolution of their disciplines due to insufficiency in teacher preparation programs. As a result, an effective teacher education program is a must for reliance education, resulting in high levels of confidence among both teachers and students (Lawal, 2003).

In order to be functional and efficient teachers in modern classroom environments, pre-service and in-service teachers should be appropriately taught. Teaching is a task that requires both theory and practice, and pre-service teachers must

grow in both areas. Many studies, on the other hand, show that most new teachers struggle to translate their content knowledge into a form that students can comprehend (Canbazoğlu, 2008; Simmons et al., 1999; Veal, Tippins, and Bell, 1998). These issues prompted the development of an efficient teacher education program that would teach teachers how to use technology effectively for instructional delivery (Baştürk, 2009).

Pre-service teachers are in the best position to continue the implementation and enhancement of the curricula at various levels of education. As a result, they must be properly taught to engage 21st century learners in current classroom settings. To put it in another way, good pre-service teacher training should include the use of technological tools to make these future instructors relevant and efficient in today's media-saturated classrooms. In recent years, academics have focused on determining the appropriateness of teacher preparation programs, as well as whether or not instructors are properly equipped to employ information and communication technology resources in the classroom (Shittu et al., 2017). Given the importance of using innovation in the classroom, Russel, Bebell, O'Dwyer, and O'Comer (2003) suggest that having teacher educators who are technologically and pedagogically groomed to use technology as part of their instructional practice is an important part of preparing teachers for the contemporary school system. Wang (2002) stated that student teachers' attitudes and perceptions of how they are prepared would play a key role in shaping their future usage of electronic resources for instructional purposes.

2.2.5 Pre-service Teachers' Intention to use Technology in the Classroom

Technology adoption is a complicated process that necessitates sufficient planning, provision, and projections from key stakeholders in the educational system. The usage of technology in teacher preparation programs at schools of education and universities around the country might be quantified in significant ways. The importance of intentions in predicting actual use of information technology has been demonstrated in studies on the adoption of information technology (Taylor and Todd, 1995; Venkatesh, Morris, Davis and Davis, 2003). A person's intention is defined as the intended outcome of their planned activities or behaviour (Ajzen, 2001). The positive intention of pre-service teachers to use technology has been found to be a strong predictor of future use and successful integration of digital tools in their classrooms (Myers and Halpin, 2002; Yushau, 2006; Pozas, Letzel and Frohn, 2022). As a result,

various studies have looked into the elements that influence pre-service teachers' acceptance of technology and their plans to use it.

At all levels of education, pre-service teachers must be adequately taught to use digital resources for instructional delivery. The intention of these prospective teachers to use technological gadgets in the classroom could be a crucial criterion for determining actual classroom usage. Teachers' attitudes toward using technology in education, pedagogical views, and intention to use technology for teaching are all crucial elements that influence pre-service teachers' technology adoption. According to Vannatta and Beyerbach (2000), higher education has established the goal of introducing technology education into teacher preparation curriculums in order to prepare pre-service teachers to use technology in the future. Several studies, however, indicated that pre-service teachers' use of technology in the classroom was below average (Gulbahar and Guven, 2008; Hsu, 2010). Several scholars suggested looking into the elements that influence pre-service teachers' technology adoption and developing different approaches to help them integrate technology into their teaching activities (Gulbahar, 2007; Milman and Molebash, 2008).

According to studies, students entering the field of education today, often known as digital natives, are technology savvy; they are able to utilise digital tools for a variety of objectives (Oblinger and Oblinger 2005; Olson, Nolin and Nelhans 2015). However, studies reveal that while pre-service teachers have positive attitudes about technology and express a desire to use it in the future, they are not prepared to use it in the classroom (Gill and Dalgarn, 2008; Lei, 2009). This strategic role of the intention to use technology is well encapsulated in Ayesha, Tim, and Peggy's (2012) submission, which states that in order to fully prepare pre-service teachers to use technologies in their classrooms, it is necessary to understand the factors that influence their intentions to use these emerging technologies to effectively engage learners in the instructional process. According to the literature, few studies have looked into the factors that influence pre-service teachers' technology integration attempts, and even fewer studies have looked into the factors that influence pre-service teachers' intent to use technology in the classroom. According to Venkatesh et al. (2003), knowing students' level of technology acceptability can explain the motives and motivators for their desire to utilise technology.

Despite the obvious advantages of incorporating technology into teaching practices, many educational programs have limits in terms of inducing or even

increasing prospective teachers' willingness to employ ICT in classroom activities (Chai, Hong, and Teo, 2009). The Internet and digital technology have already had a significant impact on these pre-service teachers' thinking, communication, and learning styles (Oblinger and Oblinger, 2005; Haleem, Javaid, Qadri and Rajiv, 2022). However, there is a question regarding whether these pre-service teachers will be able to effectively integrate this technology into their students' lessons (Lei, 2009; Ma et al., 2005). Examining pre-service teachers' intentions to use technology, thus, gives a solid framework for determining their readiness to use digital resources in future classroom activities.

2.2.6 Studies on Pre-Service Teachers' Technology Familiarity in Classroom Instruction

When assessing pre-service teachers' intentions to use technology, familiarity with technology is a crucial element to evaluate. Palak and Walls (2009) found that tutors' lack of familiarity with technology can be a barrier to technology-based intervention, limiting the adoption of technological tools and inventions (Sad and Ozhan, 2012). It is also critical for educators to be aware of their students' ICT proficiency, as this may influence their degree of participation in classroom activities (Ghavifekr, and Rosdy, 2015). To attract and maintain students' attention in classroom assignments, effective technological familiarity and different media modalities are the best ways to facilitate interaction with the system (Lee and Ryu, 2013). Students who are given direct access to a simple technological item that is stimulating and engaging are more likely to see it as a beneficial tool for developing knowledge and continue to learn using it (Butzin, 2001).

According to Karahanna, Straub, and Chervany (1999), there is a wide range of pre-service teachers' experience with technology in previous studies. The level of familiarity with digital technologies could play a big role in determining how much technology is used in the classroom. Prospective instructors' intentions to use technology were found to be based on a broader set of behavioural characteristics, according to the authors. Actual users' intent, on the other hand, was constantly influenced by perceived utility and technology familiarity. Some teachers are still unfamiliar with the benefits and acceptable usage of digital devices as strategic aspects of teaching and learning, even after several years of bringing technological tools into the instructional space (Burns, 2010). Cakir (2012) found that while some teachers are

unfamiliar with Web 2.0 technologies, few consider employing such digital tools in instructional delivery. It's becoming clear that computer literacy and the ability to use these tools successfully will be vital to success in a variety of areas. As a result, computer experience is becoming more recognised as an important component of the educational process (Loyd and Gressard, 1984).

2.2.7 Pre-Service Teachers' Technological Anxiety in Classroom Instruction

Stakeholders in the field of education should correctly address teachers' factors at all levels in order for effective technology acceptance and integration to be rooted in the instructional process. Teachers' strategic responsibilities in technology use cannot be overstated, and several essential variables that may impede their level of ICT compliance must be addressed in order for effective technology adoption and use in the classroom. Technological anxiety has remained a significant element that may influence the level of technology use in the classroom to some extent. Aversion to technical tools, as well as worry or uncertainty when working with connected technological gadgets, has been referred to as technological anxiety. As a result, this may provide a barrier to the widespread implementation and adoption of ICT, particularly in Nigeria's higher education institutions. In other words, people may be apprehensive about utilizing a computer or other kinds of technology to complete work, particularly in the classroom.

In general, technological anxiety refers to negative feelings elicited by actual or imagined interactions with digital tools or computer-related technologies. Students with a high level of computer anxiety, for example, have been found to avoid computers or broad locations where computers are located; to be highly cautious with computers; to have negative thoughts about computers; and to cut down on the amount of time they need to use computers (Bozionelos, 2001). The fear or hate of advanced complicated devices such as computers, or technology in general, is known as technophobia. It usually relates to irrational fear; however, some argue that some anxieties are reasonable. It's the polar opposite of technophilia or the love of technology.

Technological anxiety is a mindset toward technology in its different manifestations. General anxiety is divided into two categories by psychologists: trait anxiety and state anxiety (Biggs and Moore, 1993). State anxiety refers to "anxiety experienced in a specific scenario," whereas trait anxiety refers to "a general readiness to react with anxiety in numerous contexts" (Biggs and Moore, 1993). 'The dread or

apprehension individuals feel when they use computers or new technology, or when they contemplate the prospect of use" is defined as a state type of technological anxiety. (Simonson, Maurer, Montag-Toradi, and Whitaker, 1987). Bozionelos (2001); Aktağ, and Tuzcuoğlu (2016) define technological anxiety as a bad emotional state or negative cognition experienced by an individual when using technology or any technological equipment. Technological anxiety is a negative emotional response that people have when they think about or use technology, such as fear or discomfort (Hasan and Ahmed, 2010; Awofala, Akinoso, and Fatade, 2017). As a result, technological anxiety is projected to have a direct impact on the adoption of new technological products, as well as regulate the relationship between technology leadership and the desire to promote the use of information technologies in schools.

Teachers' degrees of technological anxiety are important to consider when integrating computer-related technologies into teaching and learning. Anxiety is a physiological construct that develops through time. According to Russell and Bradley (1997), technological anxiety has always existed organically as a result of people's natural aversion to new things. The hatred of technology has resulted in lesser patronage of technology gadgets and services in Nigerian institutions, which, if not addressed, may impede the information society's planned expansion. The culture and collective practices of university professors are critical to improving technology-based teaching and learning (Ahmad, Kamba, and Usman, 2012; Awofala, Akinoso, and Fatade, 2017). Anxiety about utilising technology, for example, has been found as a significant component in resisting new technologies (Buabeng-Andoh, 2012). The idea of using information communication technology (ICT) has been reported to cause high levels of anxiety in some persons (Barbeite and Weiss, 2004). Technological anxiety is a negative emotional reaction caused by the fear that employing technology may result in a poor outcome. The negative effect could be anything from the user damaging the equipment to embarrassing themselves in front of their peers. Anxiety about utilising technology has been demonstrated to have a significant negative impact on future ICT use (Beckers, Wicherts, and Schmidt, 2007; Imhof, Vollmeyer and Beierlein, 2007; Parayitam, Desai, Desai and Eason, 2010; Fatemi, Jahromi, Forouzan, and Gholaminejad, 2017).

Overall, teachers' worry will influence the extent and manner in which technology is used in the classroom. Anxiety is a significant element that needs to be addressed and managed by the teaching institution, according to Teo, Lee, and Chai

(2008); and Akta (2015). This is significant because technology has the capacity to revolutionise both classroom and non-classroom learning. Several studies have found that lecturers' fear of using computers has a detrimental impact on their use of ICT. According to Phelps and Ellis (2002), there is a significant gap between teachers' perceptions of their technical proficiency and the amount of learning required to properly use ICT. They frequently regard technology as scary and overwhelming. Anxiety may be heightened if professors believe their students' digital skills are superior to their own. This sense of inadequacy might make professors feel nervous and hesitant to employ technology. This is especially true if they are afraid of appearing inept or ignorant in front of their students (Nunan and Wong, 2005). Fear, embarrassment, disappointment, irritation, frustration, awkward feelings, feeling of retrogression in task performance, computer avoidance, fear of losing control, sweaty palms, chest pain, and trembling are among the emotions experienced by a computer anxious person, according to Morgan (1997).

2.2.8 Pre-Service Teachers' Attitude towards Technology

An individual's attitude is described as their feelings towards engaging in specific behaviors (Ajzen, 1991). An attitude in this study relates to the feelings of pre-service teachers towards employing technology in their future classrooms. The desire of trainee teachers to use technology in their teaching practices is better predicted by their attitude toward adopting ICT (Zhang, Aikman, and Sun, 2008). As a result, instructors' attitudes about a certain technology can be a useful metric for predicting the success or failure of a new information system's implementation, as well as detecting and correcting potential errors. To properly build a teacher training curriculum that will educate teachers to address the problems of the information age, teacher educators must first understand the factors that impact pre-service teachers' attitudes about technological instruments (Fisher, 2000).

Huang and Liaw (2005), as well as Hidalgo-Cabrillana and Lopez-Mayan (2018), stated that the success of any endeavor to integrate technology into an educational program is heavily reliant on the support and attitudes of the teachers engaged. Teachers are less inclined to incorporate technology into their teaching and learning if they believe or perceive proposed computer-related programs as meeting neither their needs nor the requirements of their pupils. Teachers' views regarding computers are among the factors that influence how well computers are used in the

classroom. Teachers' values and views regarding pedagogy and technology, according to Zevenbregen and Lerman (2008), mediate how they will use such technologies. The adopted teaching methodologies or the technology tools themselves may be the source of the beliefs and values. Teachers who hold strong ideas about how students should learn mathematics, for example, are more likely to use tactics that support those beliefs. Similarly, if they regard technology as a tool capable of performing specific purposes, the technology will carry out those functions.

Much research has been conducted on the impact of teachers' attitudes on classroom ICT use. When it comes to attitudes regarding computer technology, Mueller et al. (2008) discovered that attitude is a key factor in distinguishing effective integrators from those who aren't. They discovered that teachers who saw computer technology as a practical, productive, and cognitive tool were more successful in integrating it into their classrooms. Furthermore, teacher motivation was influenced by the perceived usefulness of computers, whereas support and computer fear had only a minor impact on utilization. In his study on the use of instructional technology, Bruess (2003) asserted that students' attitudes play a crucial role in shaping their learning in the classroom. Furthermore, Wangpipatwong (2008) asserts that students' attitudes regarding computers influence their intention and impression of adopting e-learning, based on the case study at Bangkok University.

The support and attitudes of the teachers are critical to the successful deployment of instructional technology in a school's programme. It is thought that if teachers consider that technology-related tasks do not meet their needs or the needs of their pupils, they are unlikely to integrate it into their teaching and learning. Teachers' attitudes and views about technology are among the elements that determine the successful integration of ICT into instruction (Hew and Brush, 2007; Keengwe and Onchwari, 2008; Vez and Uyangör, 2016; Salam, Zeng, Pathan, Latif, and Shareen, 2018). Teachers can easily provide useful information about the adoption and integration of ICT into teaching and learning processes if their views toward the use of educational technology are positive.

In particular, research shows that teachers' attitudes and acceptance of technology are critical to successful pedagogical use of ICT (Hernandez-Ramos, 2014; Luan and Teo, 2009; González, Conde, Daz, Garca, and Ricoy, 2018). According to research, pre-service teachers' attitudes toward technology are the best predictors of classroom technology use (Russell et al., 2003). This shows that if pre-service teachers

have used technology and found it beneficial to their learning, they will acquire positive attitudes toward it and be more likely to employ it in their future classrooms.

2.2.9 Accessibility to Technological Resources

At all levels of education, technology has continued to play significant roles in facilitating the delivery of instruction. Only if teachers have access to available resources inside the learning area will the instructional benefits of technology in teaching and learning be realised. Before teachers may access materials to facilitate instructional delivery, Apagu and Wakili (2015) and Ikemelu (2015) feel that technology resources must first be made available. This means that concerns of availability and accessibility in the educational system are intertwined, and educational stakeholders must prioritise them. At all levels of education, the issue of accessibility is critical to effective technology utilization. Teachers must have unlimited access to the available digital resources inside the instructional process, for any technology integration attempt to succeed. According to Land and Hannafin (2000), pragmatic considerations such as the lack of access to ICT resources might limit the use of ICT such as computers, mobile phones, and the Internet in teaching and learning. ICT access and use are changeable assets in a successful education. As a result, if students and teachers have access to ICT resources and use them pedagogically, the benefits of ICT in teaching and learning can be realised. Several studies have found that the lack of ICT access, particularly at home, is a significant barrier to incorporating ICT into teaching and learning (Pelgrum, 2001; Sicilia, 2005; Bingimlas, 2009; Ugwuoke, 2017).

Teachers would not be able to give ICT-enriched lessons to their students if they did not have enough access to diverse technological resources, such as computers, the Internet, and technology specialists (Alston, Miller, and Williams, 2003). According to researchers at the Center for Applied Special Technology (2006), acquiring computers and other relevant resources is not enough to ensure teachers' usage of ICT resources; proper access is also required. This can take the form of placing ICT resources in a convenient area where teachers can access them without difficulty. Because of the convenience of availability, the resources may be used more frequently. According to Ertner (2005), purchasing computers for a school is only the beginning of securing their use.

In other words, teachers must have easy access to a variety of technological tools in order to effectively use ICT in the classroom. In North Carolina schools, Alston,

Miller, and Williams (2003) discovered that certain forms of technology were generally available and accessible for teachers to use. These many ICT resources might be found in the classroom or were freely available across the building. As a result, access location might be considered a significant element that influences instructors' utilization of ICT resources. When it comes to integrating technology into the classroom, having access to ICT within the school is critical (Alston, Miller, and Williams, 2003; Sun and Chen, 2016). Teachers' ability to effectively use ICT resources is reliant on their ability to access various sorts of ICT resources (Alson, Miller, and Williams, 2003). According to Olatokun (2007), boosting the availability and access to ICT resources is critical to enabling women in academia to reap the benefits of employing technology in performing various duties and implementing educational programs.

If the major objectives of using technology in the classroom are to be realised, these challenges must be appropriately handled by educational stakeholders in the country. According to studies, technical resources in Nigerian schools are insufficient to support the media-based teaching process. According to Abdul-Salaam (2012) and Poushter (2016), students and professors at the institutions studied did not have immediate access to computers and computer-related materials. Furthermore, the research shows that the vast majority of Nigerian secondary schools are not connected to the Internet. Those that use PCs lack the necessary instructional programming that their students require in most circumstances.

Sometimes, technological resources are readily available, but teachers do not have direct access to them. As a result, the materials' intended purpose could be thwarted. This is why providing answers to the difficulties related with the use of technology in the classroom requires a deliberate approach.

2.3 Empirical Review

2.3.1 Studies on Pre-Service Teachers' Intention to use Technology for Classroom Instruction

The goal of pre-service teacher's education programme is to provide these trainees with the necessary skills and competency to perform effectively in modern classrooms. The intention of prospective teachers to use technological tools in future classroom practices can be used to gauge their level of technology acceptance. As a result, researchers conducted research to see how much these student teachers intend to

use technology to give successful instruction. Understanding pre-service teachers' intentions to use technology could provide education stakeholders with valuable insight into how teacher education programs should be restructured in the future to generate effective 21st century instructors. It is critical to guarantee that teachers integrate technology into the curriculum in order to achieve greatness in schools. As a result, the foundation must be laid at the level of the trainee or pre-service teacher. If we do not we will end up with future teachers who do not know how to use technology well. Pre-service teachers should be given the tools and experience that will be valuable in their future professions, such as classroom instruction, research, and problem-solving during their training. Pre-service instructors can design their environment and adapt their educational tactics with the use of technology (Zhang and Espinosa, 1997).

Various studies were conducted to examine pre-service teachers' intentions to use technology in various educational settings. Shittu, Kareem, Obielodan, and Fakomogbon (2017) investigated the intention of pre-service science teachers to use e-resources in the classroom. The study's findings revealed that there was a substantial difference in pre-service teachers' intentions to use e-resources for teaching between male and female pre-service teachers. As a result, the findings of the study support the validity of the technology acceptance model construct and show that pre-service teachers' technology preparation is insufficient to instill behavioural ideas about the future use of e-resources in the classroom. Researchers have investigated how pre-service teachers felt about integrating technology into the classroom and how they planned to do it. Coutinho (2008) conducted a study that confirmed the relevance of giving pre-service teachers opportunities to learn how to integrate technology into their future classrooms. Pre-service teachers used various platforms, such as blogs, wikis, and Google, to achieve various educational aims in the study. Participants showed good intentions to employ these technologies for instructional reasons, according to the findings. Coutinho's (2008) study shed light on pre-service teachers' objectives, but it was primarily concerned with how they employed technology during their teacher education programme.

Most pre-service teachers aim to use blogs, wikis, and social networking platforms in their future classrooms, according to Ayesha, Tim, and Peggy (2012) and Beemt, Thurlings, and Willems (2020). They feel that incorporating these technologies into the teaching and learning environment can help students learn more effectively. While pre-service teachers agree that Web 2.0 technologies have enormous potential in

K-12 education, they also believe that it is contingent on the teacher's ability to meaningfully integrate these technologies with the topic being taught and the students' age level. As a result, teacher educators must assist pre-service teachers in comprehending the significance of the links between technology, content, and pedagogy. Meaningful technology integration can be achieved, according to Lei (2001) and Chukwuemeka, Nsofor, Falode, and Anaiah (2019), by assisting pre-service teachers in developing technical pedagogical topic knowledge (TPCK). As a result, pre-service teacher education programs should provide tactics that pre-service teachers can employ to influence student learning based on their grade level interests and topic areas.

According to studies, perceived utility and ease of use were the most important elements influencing pre-service teachers' inclinations to use technology (Teo, Lee, and Chai, 2008; Sadaf, Newby and Ertmer, 2012). Self-efficacy was found to be a significant factor of intentions and use in certain research (Anderson and Maninger, 2007; Chen, 2010; Giallamas and Nikolopoulou, 2010). Anderson and Maninger (2007), for example, investigated the elements that best predicted pre-service teachers' intentions to use specific technologies and discovered that value beliefs and self-efficacy were important predictors. Subjective norms (i.e. a person's behavior influenced by others) and conducive conditions (i.e. available resources and technology) have been shown to influence pre-service teachers' intentions to utilise computers in other studies (Teo, 2009a; Abanosi and Abanobi, 2017). Although these studies have investigated the factors that influence pre-service teachers' technology integration efforts in various contexts and with various technologies, there has been little research into the powerful local factors that influence pre-service teachers' intentions to use technology in schools. Perceived usefulness, perceived ease of use, computer self-efficacy, and attitude toward computer use are all key factors of the desire to use computers, according to Fokides (2017). The impact of attitude toward computer use and perceived utility on behavioural intention to use computers was significant.

2.3.2 Performance Expectancy and Intention to use Technology in the Classroom

Pre-service teachers' intentions to use technology may be affected by the advantages that such digital tools may provide in terms of their ability to enhance the teaching process and engage students in classroom activities. According to the

developers of the UTAUT model, this is referred to as "performance expectancy." Performance expectancy, as defined by Venkatesh et al. (2003), is the degree to which a person believes that utilizing the system would help him or her improve his or her performance and, hence, improve the quality of his or her work. In other words, performance expectancy is an individual's conviction in a technology tool's ability to bring about the desired change in task execution/implementation. Performance expectancy in the classroom can be defined as the expected benefits to the teaching-learning process from the effective integration of technological resources. It's worth noting that teachers use technology in the classroom to improve educational delivery at all levels of school.

Therefore, pre-service teachers' intentions to use technology in the classroom may be influenced by their performance expectancy. Individuals make plans to engage in behaviors that they believe would improve their performance. Attitudes influence beliefs, which, in turn, shape intentions and, as a result, behaviours (Davis et al., 1989). Performance expectancy was found to have a strong favourable effect on MOOC usage intention, according to Eli, Craig, George, and Kwame (2018). In addition, Paul-Juinn, (2013) discovered that users' intent to use English e-learning websites are positively influenced by their performance expectations. This means that when students expect an English e-learning website to help them improve their performance, they are more likely to use it right now or in the near future.

Hamzat and Mabawoku (2018) investigated engineering lecturers' performance expectations in the usage of libraries in universities in southwest Nigeria. According to them, a large percentage of engineering professors use digital library resources since it allows them to participate in global collaborative research. In other words, engineering teachers in Nigerian institutions used digital library resources because they expected to perform well. Tabassum et al. (2015) claim that staff and students' understanding of the search domain, the quality of digital library materials, system characteristics, and performance expectancy influence their intention to utilise the web-based library system. Similarly, Zhenghao, Alcorn, Christensen, Eriksson, Koller, and Emanuel (2015) claim that behavioural intention to utilise web-based technology is directly influenced by performance expectancy. As a result, pre-service teachers' intentions to use technology might be positively influenced by the anticipated benefits that such digital tools might provide in terms of effective instructional delivery. When a digital tool provides no major value to the educational delivery process, pre-service teachers

are unlikely to incorporate it into their future classroom practices. As a result, there appears to be a strong link between pre-service teachers' intention to employ technology for instructional delivery and their performance expectancy.

2.3.3 Effort Expectancy and Intention to use Technology in the Classroom

The UTAUT model highlights the significant effect of effort expectancy in determining whether or not consumers would utilise a system or participate in an activity. According to Venkatesh et al. (2003), effort expectancy is the ease with which a system can be used. This construct is referred to as perceived ease of use by Davis et al. (1989), and it refers to the degree to which an individual believes utilizing a certain system will be stress free. Individuals expect to be able to quickly deploy a tool in order to do tasks with minimal stress or trouble. As a result, effort expectancy refers to the amount of effort or energy required to get the most out of a technical product.

In a classroom context, effort expectancy may influence the intention to use and the actual use of technology for classroom activities to some amount. Teachers would be more likely to employ a technological instrument that is flexible and user-friendly than one that demands a difficult operation. Any device that requires little effort to operate would be preferred by teachers. This is why some researchers refer to effort expectancy as perceived technology ease of use. Teachers-in-training are expected to use technology to engage students in a modern classroom setting. This, however, can be accomplished only if the operational complexity connected with the employment of technology instruments are reduced to the bare minimum. In other words, the amount of effort required for pre-service teachers to operate a digital gadget may have a significant impact on their desire to employ such a technology in future classroom practices.

Another important factor in determining teachers' willingness to employ technology in the classroom is social influence. According to Zhenghao, Alcorn, Christensen, Eriksson, Koller, and Emanuel (2015), the UTAUT model's effort expectancy directly influences behavioural intention to use a specific technology, which is regulated by gender, age, and experience. Similarly, Tan (2013) investigated Taiwanese college students' approval of English e-learning websites in Taiwan using the UTAUT as a theoretical lens. They discovered that behavioral intention to use e-learning materials had a beneficial effect on effort expectancy. Their research also demonstrated that the utilization of English e-learning websites was directly influenced

by facilitating conditions. The result is that the ease with which students can navigate an e-learning website has a significant impact on their level of online participation. Consequently, users' intention to use e-learning platforms for instructional activities is closely linked to their effort expectancy.

Dulle (2015) used the UTAUT to perform a study on open access educational resources in Tanzanian universities. The study discovered that researchers' behavioural intention to use open-access educational content is influenced by their expectation of difficulty. Performance expectancy, effort expectancy, social influence, perceived playfulness, and self-management of learning were all major drivers of behavioural intention to use mobile learning resources in an instructional setting, according to Wang, Wu, and Wang (2009). As a result, the effort expectations connected with ICT tools and other online learning platforms may impact teachers' intentions to use them. Pre-service instructors would like to use any technology item that required little effort to operate.

2.3.4 Social Influence and Intention to use Technology in the Classroom

This refers to how a person is influenced by key persons in his or her social environment to use a system on an interpersonal level. Many studies have used social influence to predict a person's behavior (Venkatesh et al., 2012; Sarfaraz 2017). Consumer propensity to adopt pre-payment metering systems was directly influenced by social influence, according to Bandyopadhyay & Bandyopadhyay (2008). Social influence is a significant component in many parts of citizens' lives, and it is likely to have an impact on people's decision-making processes (Venkatesh et al., 2012). Citizens' decisions to join in an activity or utilise a certain technology may be influenced by relevant references such as citizens, family, coworkers, and friends (Al-Sebie and Irani, 2009).

De˘cman (2015) conducted research to see how UTAUT variables affected people's willingness to use an e-learning system in an obligatory context. For data validation, the researchers employed factor analysis and structural equation modeling. The UTAUT model was shown to be a good fit for examining technology adoption in an e-learning scenario. Social influence and performance expectations were found to have a considerable impact on technology usage intentions. Social influence directly influences behavioural intention to use online resources, according to Zhenghao, Alcorn, Christensen, Eriksson, Koller, and Emanuel (2015), and is regulated by gender,

age, experience, and voluntariness of use. According to Tan (2013), social influence has a beneficial impact on users' intent to use English e-learning websites. This suggests that when teachers, peers, or someone important to the students suggests that they use English e-learning websites, they are more likely to do so.

Individual intention to use mobile commerce software to transact business is highly influenced by social influence (Yu, 2012). It symbolises the social pressure from close friends and family to utilise mobile commerce software for payment transactions. They have an impact on the consumer's decision to conduct or not perform the desired behaviour. Secondary school teachers' approval of a digital learning environment (DLE) was investigated by Pynoo, Devolder, Tondeur, van Braak, Duyck, and Duyck (2011). The study found that performance expectations and social pressure from superiors to utilise the DLE were the most important determinants of DLE acceptance and the intention to use.

However, according to Magsamen-Conrad, Upadhyaya, Joa, and Dowd (2015), social influence has little effect on tablet use intentions. According to the findings of Eli, Craig, George, and Kwame (2018), students believe they do not require the support of their social circle or friends to be motivated to participate in the MOOC. Because of the contradictions in the literature, this construct, as well as the entire UTAUT model, has to be tested in a Nigerian educational setting.

2.3.5 Facilitating Conditions and Intention to use Technology in the Classroom

The use of technology in the classroom cannot be done in isolation; some facilities and structures must be in place in order to provide a stimulating media-mediated learning environment. Facilitating conditions refer to these support and structures, and the construct is a key component of the UTAUT model. The degree to which an individual believes that an organizational and technological infrastructure exists to facilitate the usage of a system to complete a specific activity is defined as facilitating conditions (Venkatesh et al. 2003). This indicates that certain infrastructure and organizational structures are required for consumers to employ technology to complete a task.

There appears to be a substantial link between facilitating conditions and the usage of technology by teachers in the classroom. Researchers' intentions to use open-access educational content are greatly affected by facilitating conditions, according to Dulle (2015). Pre-service teachers' intentions to employ technology in future classroom

practices may be influenced by the presence of various supporting structures. Venkatesh et al. (2003) claim that facilitating conditions have a direct impact on usage behavior and are regulated by age and experience. Eli, Craig, George, and Kwame (2018) discovered that facilitating conditions had a significant impact on students' use of Massive Open Online Courses (MOOCs). In particular, most research discovered that facilitating settings have a beneficial impact on attitudes about computer use (Ngai et al., 2007; Teo, 2008).

According to research from around the world, facilitating conditions might be a strategic component when it comes to teachers' usage of technology. In Nigeria, Hamzat and Mabawoku (2018) found that improving technical infrastructure, accessibility, human resources, and skills had a considerable favourable influence on engineering lecturers' utilization of the digital library. The findings backed up Teo and Milutinovic's (2015) claim that facilitating conditions had a substantial impact on pre-service teachers' perceptions of the utility and ease of use of computers in the classroom. Infrastructure, access to networked technologies, and training opportunities were identified by Gogus and Nistor (2012) as supportive circumstances pushing teachers to employ new technology in their particular schools in Turkey.

According to Tan (2013), facilitating conditions or enabling environments have a favourable impact on users' behaviour when using English e-learning websites. This suggests that when students have more favourable settings for using English e-learning websites, they are more likely to use them. Teo (2009a), who showed that the enabling condition was a predictor of attitude toward computer use and perceived ease of use, agreed with this conclusion. In the context of proper support, it appeared that a user would develop a positive attitude toward technology use and assume that utilizing technology would be relatively painless. Tabassum (2015) of Dhaka, Bangladesh, claimed that conducive conditions impacting digital library usage include the user's understanding of the search topic, the quality of digital library content, system characteristics, and service quality.

2.3.6 Pre-service Teachers' Technology Iamiliarity and the Intention to use Technology

Teachers must be familiar with digital technologies that can be utilised to facilitate instructional delivery because technology has pervaded all elements of teaching and learning. Technology familiarity is still a key metric for determining the

pace of technology adoption, particularly among prospective teachers' intentions to use technology in the classroom in the future. When teachers are comfortable with a digital gadget, it may be much easier for them to adopt it for educational purposes. This is why, if the requisite facilities and training are available, the usage of electronic gadgets such as cell phones and iPads could enjoy unprecedented levels of acceptance among teachers and pupils. Scholars conducted research into the relationship between teachers' technological familiarity and their intention to employ technology in the classroom. According to Ifeanyi and Chukwuere (2018), participants' familiarity with mobile technology had a substantial impact on their level of use of mobile phones for classroom activities. According to Madadi, Iravani, and Nooghabi (2011), the degree of acquaintance with ICT, educational degree, and type of work all have a positive and meaningful link with ICT usage. As a result, the extent to which people use information and communication technology is directly related to their familiarity with the technology, their educational level, and the type of job they have.

Students who are familiar with ICT have good attitudes toward using it for personal and educational objectives, according to a study conducted by Jasmine (2014) to evaluate students' familiarity with ICT. She came to the conclusion that if students are given direct access to ICT resources, they should make good use of it by channeling it into educational programmes. In addition, according to research conducted by Balarabe (2006) to determine the extent of computer software use among university professors, forty percent of faculty professors use the computer in teaching every week; more than eighty percent of mathematics faculty professors are at least proficient in word processing; fifty percent are proficient in computer algebra systems; forty percent are proficient in programming languages; twenty percent are proficient in Internet design programs; and sixty percent are proficient in presentation skills. Similarly, Shanley, Guerreiro, Cary, Clarke, and Jungjohann (2015) examined data from a feasibility study to see if there's a link between teacher-reported technological familiarity and the implementation of an iPad-delivered kindergarten mathematics intervention prototype. The findings revealed that teacher and student satisfaction levels were acceptable, that participating teachers had varying levels of technological familiarity, and that teachers with a high level of comfort and experience may require targeted professional development and usage guidelines.

Yang (2015) also studied the impact of persons who are tech savvy (tech geeks) on their willingness to pay for newly released electronic devices at Weber State

University. The findings demonstrated that their level of technological knowledge had no bearing on their willingness to pay for freshly released electronic devices. Olibie and Ezenwanne (2013) also conducted a study to assess home economics instructors' familiarity with, and usage of, ICT in Anambra State Junior Secondary Schools. Teachers' knowledge, with the potential of ICT in home economics for instructional delivery, was poor, and their familiarity with ICT resources corresponds positively with the level of technology use in the classroom, according to the findings. Baran and Klç, (2015) discovered how university students' demographics, study habits, and familiarity with technology connect with their self-reported GPAs in their study. Gender, study habits, and familiarity with technology are all crucial aspects that could explain university students' success, according to this study.

Kennedy, Krause, Judd, Churchward, and Gray (2006) conducted a survey of first-year undergraduate students at Melbourne University in Australia to gather quantitative and qualitative data on their technological usage. Students in their first year of university indicated a high level of familiarity with technology such as cell phones, desktop computers, and the Internet, which influenced their preparedness to use such devices for instructional duties. In the United Kingdom, Eynon (2009) discovered that young people aged 17 to 19 are relatively high technology users who engage in a wide range of activities. Thinyane (2010) found that university students in South Africa have a high level of access to, and familiarity with mobile phones. According to Oliver and Goerke (2007), first-year undergraduates' acquaintance with digital tools such as laptops, mobile phones, and music players, as well as their usage of instant messaging, blogs, and podcasts in Australian universities, is fast increasing.

According to Balarabe (2006), mathematics academics at King Fahd University of Petroleum and Minerals have a good attitude toward computers and appear convinced of the positive role computers may play in teaching and studying mathematics. The only irritant is the technical know-how and experience required to guide pedagogical activities toward efficient and proper use of modern technologies. Only twenty percent said they are proficient at Internet design programmes (such as FrontPage), while sixty percent said they are familiar with presentation programmes like PowerPoint on average. The findings also suggest that mathematics academics' experience with technology affected their willingness to employ presenting programs in the classroom. According to Basri, Alandejani, and Almadani (2018), the level of ICT usage is positively related to ICT familiarity, educational degree, and kind of work.

The level of knowledge with, and use of, ICT in organizational activities can be a good measure of how far ICT has progressed in a country's educational organizations and institutions.

2.3.7 Pre-service Teachers' Technological Anxiety and the Intention to use Technology

Teachers must be confident in their ability to successfully deploy linked devices in classroom activities while using technological tools. Teachers have been noted to confront certain difficulties in terms of apprehension or phobia when it comes to properly using technology to engage 21st century learners who live in media-rich surroundings. Teachers may be concerned that they lack the necessary skills to engage technology savvy kids in the classroom. Teachers' intentions to employ technology in the classroom are, to some extent, influenced by technology anxiety. According to Rovi and Childress (2003) and Raja and Nagasubramani (2018), technology has become indispensable in the lives of students, improving academic performance and enhancing learning. However, its application in schools has been limited due to teachers' unwillingness to incorporate them into their lessons due to their fear of technology. Anxiety, according to Bourne (2005), is a subjective feeling of apprehension or uneasiness when faced with a specific activity. People feel safer, as long as they stay away from stressful situations. Anxiety is a physiological, behavioral, and psychological response to observable physical reactions that occur within. Technical anxiety, according to Rosen and Weil (1995), is defined as worry or anxiety about utilising technological tools, aversion to discussing computer-related gadgets, and angry or violent thoughts about these technologies.

When a person uses technology or technical equipment, and it happens that he or she experiences a bad emotional state or a negative cognition, this is known as technological anxiety (Bozionelos, 2001; Hoge, Bickham, and Cantor, 2017). Technological anxiety is a negative emotional response that people have when they think about or use technology, such as fear or discomfort (Hasan and Ahmed, 2010). As a result, technological anxiety is projected to have a direct impact on the adoption of new technological products, as well as regulate the relationship between technology leadership and the desire to promote the use of information technologies in schools. In a study of 10,000 schools in high-risk areas, researchers discovered that teachers either

used technology rarely or for non-essential activities like drills, rather than critical thinking and problem-solving (Ross et al., 2004).

Technological anxiety is a crucial element in a person's decision to use technology in school (Gurcan-Namlu and Ceyhan, 2003). Teachers' technological anxiety was linked to their avoidance of it, according to studies, resulting in negative feelings, worry, and fear of utilising the tool (Mcilroy and Bunting, 2003). Teachers who used computers in their homes and had prior computer knowledge showed lower anxiety and more favorable views toward technology than those who had no prior computer experience. Gurcan-Namlu (2002) discovered a link between a person's personality type and technology fear. Introverted students exhibited a higher level of anxiety about using technology than extroverted ones, according to the study.

Furthermore, in-service teachers face a huge problem with computer phobia. This nervousness leads to a lack of trust in using technology, resulting in inefficient technology implementation in schools (Hallam, 2008). Researchers (Tsai and Tsai, 2003; Pellas, 2014; Rasouli, Alipour, and Ebrahim, 2018) discovered a substantial connection between students' meta-cognitive skills, computer achievement, and their level of computer anxiety in a study on computer achievement, attitude, and anxiety.

Teo, Lee, and Chai (2008) suggest that anxiety is an important element that teaching institutions should address and manage. This is significant because technology has the capacity to revolutionise both classroom and non-classroom learning. Overall, instructors' worry will influence the extent and manner in which technology is used in the classroom. Computer anxiety has been linked to age (Namlu and Ceyhan, 2002), frequency of computer use (Sweet and Meates, 2004), computer experience (Yaghi and Gait, 2002), neuroticism (Anthony, Clarke, and Anderson, 2000), individual's assessment of computing situation (Crable, Brodzinski, Scherer, and Jones,1994), and self-efficacy (Crable, Brodzinski, Scherer, and Simsek, 2011; Awofala, Olabiyi, Awofala, Arigbabu, Fatade, and Udeani, 2019). Moreover, Russell and Bradley (1998) discovered that teachers' perceptions of computer use are related to an individual's level of computer anxiety in a survey of 350 primary and secondary school teachers in Australia. Tsai and Tsai (2003) discovered a substantial relationship between students' meta-cognitive skills, computer achievement, and their level of computer anxiety in a study of 75 Taiwanese computer students' achievement, attitude, and anxiety. Similarly, Hong, Chan-Jer, Chien-Yun, Ming-Yueh, Pei-Hsin, and Lee (2012) found that increased technological anxiety was adversely related to the perceived ease of use of

technology (PEU). The perceived usefulness of IT, on the other hand, was positively connected with implicit learning ability.

A correlation between gender, computer fear, and self-efficacy has been discovered in some research (Kay, 2007). For example, Namlu and Ceylan (2002) found that gender, department, and overall class competence level all influenced computer anxiety. Female students, on average, exhibited more computer anxiety than male pupils, according to the findings. They also discovered that computer usage experience and computer anxiety have an inverse relationship. Technological anxiety has been linked to poor classroom performance, according to Parayitam, Desai, Desai, and Eason (2010). According to Hacer (2022), computer anxiety has been found to affect teachers' computer self-efficacy and attitude toward using technology for instructional activities. Also, music teachers who have their own computers, use computers regularly; they have more experience with computers, have lower computer anxiety and have higher self-efficacy. A high level of a substantial negative association between computer self-efficacy and computer anxiety was also discovered in the study.

2.3.8 Pre-service Teachers' Attitude towards Technology and the Intention to use Technology

Attitude is crucial in the uptake of technology at all levels of schooling. People's attitudes are shaped by their views about technology and the weight they place on those beliefs. People will have favourable attitudes toward behaviour if they believe that their actions have positive outcomes. As a result, favorable or negative attitudes about new technology should be based on perceptions about the technology's beneficial or bad qualities. The successful appraisal of a given work is characterised as attitude (Ajzen and Fishbein 1977). In other words, a user's attitude toward technology use describes how he or she enjoys or dislikes using technology, as well as the elements that impact the intended behaviour. It also reflects how much effort a person would put in to carry out the behaviour (Ajzen and Fishbein 1980). The TRA and TPB both underlined the attitude-intention relationship, implying that an individual's attitude is an evaluative predisposition to a behaviour as a function of its decisive personal implications (Ajzen 1985).

Zhao, Tan, and Mishra (2001) and Beri and Sharma (2019) offered evidence that teachers' attitudes are directly associated to computer use in the classroom, supporting the importance of instructors' attitudes regarding computer use. Teachers,

for example, frequently use computers to complete housekeeping jobs, manage their kids more effectively, and interact with parents more effectively. The mindset of teachers and their readiness to accept technology will be critical to the effectiveness of student learning using computer technology (Teo, 2006; Leask and Pachler, 2014). Understanding teachers' attitudes toward computer use can help researchers learn more about how to integrate, accept, and employ technology in teaching and learning.

Ifenthaler and Schweinbenz (2013) investigated teachers' attitudes toward technology after being exposed to it. The purpose of this study was to find out what teachers thought they required to properly use technology. Teachers' intentions to use technology in the classroom were highly influenced by their attitude, according to the findings. Pre-service teachers, according to Süleyman and Özlem (2014), have a favourable attitude about the use of mobile devices in the future performance of their jobs. There is a strong link between one's attitude about computers and their intention to use them. The ongoing and persistent usage of technology is related with positive attitudes toward its utilisation (Teo, 2010). Demirci (2009) investigated the attitudes of Turkish teachers on the use of Geographic Information Systems (GIS). Despite obstacles such as a shortage of hardware and software, the study found that teachers' positive attitudes about GIS were a key factor in the successful integration of GIS into geography lectures.

Pre-service teachers' attitudes and perceptions of the utility of Web 2.0 tools are the main drivers of their intentions to utilise Web 2.0 technologies in the classroom (Ayesha, Tim, and Peggy 2012). Each of the three factors, perceived usefulness, perceived simplicity of use, and perceived compatibility, were validated by regression results, and each factor explained a considerable variance in attitude (seventy-eight point three percent). Pre-service teachers said Web 2.0 tools were helpful for student engagement, motivation, cooperation, communication, a variety of learning experiences, and keeping students' attention. According to Al-Fauzan and Hussein (2017), students' attitude was a strong predictor of their intention to use e-learning. As a result, it is clear that students' attitudes have a significant impact in their desire to use an e-learning system. Teo (2008) investigated pre-service teachers in Singapore about their attitudes toward computer use in a similar study. He discovered that teachers' attitudes about computers and the intentions to use them were more positive than their assessments of the computer's usefulness and control. According to Teo and Zhou (2014), perceived usefulness and attitude toward computer use were important drivers

of technology intention, while perceived ease of use influenced technology intention through attitude toward computer use.

Similarly, several studies (Kersaint, Horton, Stohl, and Garofalo, 2003; Mukherjee and Maity, 2019) discovered that pre-service teachers with positive attitudes toward ICT were more likely to integrate technology into their instruction. Teo (2009) discovered that negative views about ICT were a hindrance to pre-service teachers employing technology in the learning setting in another study in Singapore's pre-service teacher training context. The outcomes of this research suggest that looking for elements that can help pre-service teachers improve their views during the early phases of ICT adoption should not be disregarded. In their examination of numerous important cross-cultural studies, Knezek and Christensen (2002) accorded surprising priority to instructors' opinions toward ICT skills, which most studies have indicated as a requirement for ICT usage (Steketee, 2005; Ndibalema, 2014).

They believed that pre-service teachers go through the process of ICT integration in a series of well-defined stages, with the users acquiring favourable attitudes first, rather than learning how to utilise the technology. As a result, it's not unexpected that some academics believe that examining teachers' attitudes is important because such attitudes are a big predictor of how they'll use technology in the classroom in the future (Huang and Liaw, 2005). However, other scholars, such as Gotkas, Yildirim, and Yildirim (2009), contested this claim, saying that having a good attitude toward ICT isn't enough to accomplish successful and meaningful ICT integration in the classroom. Beliefs, self-confidence, technology knowledge, school culture, access, and leadership support are all key elements to consider.

2.3.9 Accessibility to Technological Resources and the Intention to use Technology

Teachers' intentions to employ technological gadgets in the educational process are influenced by the principles of availability and accessibility. The provision of adequate learning resources to instructors to assist classroom activities is referred to as availability. With a mean score of 1.8 on the measuring scale, Apagu and Wakili (2015) discovered that facilities such as computers, film strips, and CCTV were not appropriately provided. For successful technological integration efforts, the problem of access is crucial. ICT resources were not available in schools for teachers and students to use, according to Amuchie (2015), which was a major impediment to effective

technology use for learning activities. Many variables were also identified by teachers and principals as being barriers to the successful use of ICTs in secondary school teaching and learning. Poor power supply, a lack of properly qualified teachers in the use of ICTs in the classroom, and the expensive cost of computers and accessories are just a few of them.

Several studies have found that a lack of ICT access, particularly at home, is a significant barrier to incorporating ICT into teaching and learning (Pelgrum, 2001; Sicilia, 2005; Bingimlas, 2009; Bhatia and Ilyas, 2019). Pelgrum (2001) gathered information on the key barriers to the effective and efficient use of ICT in schools from practitioners in 26 countries. Four of the top ten hurdles were found to be related to insufficient computers, insufficient peripherals, insufficient software, and insufficient simultaneous Internet access, according to the findings. According to Tella *et al* (2007), the use of ICT tools in African countries like Ghana and Nigeria is on the rise and developing rapidly. However, while there is a wealth of empirical research about the availability and use of ICT tools among teachers and students in affluent or developed nations, there is relatively little literature on teachers' access to and use of ICT tools in developing countries (Beukes-Amis and Chiware, 2007).

According to studies, issues of accessibility have been addressed to a large extent in the world's developed countries. In a piece of survey research, European Schoolnet and the University of Liege (2013) presented a complete report on the access and use of ICT tools by teachers and students from 31 European countries, as well as teachers' competencies in ICT use in European schools. The findings demonstrate that a large number of teachers have access to computers and other ICT equipment for use in the classroom.

In Nigeria, however, accessibility and availability have been cited as barriers to efficient technology use at all levels of education. Many teachers, according to studies, do not have access to technology gadgets for educational purposes. According to Nwosu, Shaffe, and Nurzatul (2018), the low level of ICT use among teachers in Aba North District secondary schools is due to a shortage of technological resources and a lack of ICT expertise among teachers. "For successful ICT integration in the district, instructors must have access to various digital tools and be highly skilled in using technical equipment for instructional activities," according to the report. In developing countries such as Ghana, 11 out of every one hundred people have access to the Internet, with 100.3 mobile phones and 13.8 computers per hundred people; and in Nigeria, 9.1

out of every one hundred people have access to the Internet, with 67.7 mobile phones and 11.4 computers per one hundred people (International Telecommunications Union, 2012).

Aramide, Olaojo, and Adekanye (2013) discovered that the location of access and ICT use, as well as the degree of accessibility and ICT use, have favourable associations. The location of access and the degree of accessibility were also found to have a beneficial effect. In addition, a substantial association was discovered between the location of ICT access, the degree of ICT accessibility, and ICT use. The degree of accessibility, rather than the location of ICT access, was found to have a greater impact on ICT use among scientific teachers. The location and degree of accessibility were found to account for 25.6 percent of the total variation in ICT use among science teachers in Nigeria's Federal Unity Schools.

2.3.10 School Location Preference and Teachers' Intention to use Technology

The aim to employ technology for educational delivery may, to some extent, be influenced by the school's location. Although it may not be a deciding factor in rich countries, schools in poor countries are typically polarised, depending on their proximity to economic activity centres. In Nigeria and other nations in sub-Saharan Africa, infrastructure appears to be concentrated in major cities and towns, compared to what is available in rural areas. In other words, residents of cities and towns typically have access to amenities such as the Internet, electricity, and ICT tools. At the same time, such resources are scarce in Nigeria's rural areas. According to Ghavifekr and Rosdy (2015), a lack of proper ICT equipment and Internet access is one of the most pressing issues that schools, particularly in rural regions of developing nations, are currently confronting.

As a result, schools in the city would have access to these supporting resources, allowing instructors to employ technology in the classroom; but schools in rural areas might not. The inference is that a school's location may have a direct impact on teachers' intentions to use technology to deliver instruction. Pre-service teachers claimed in the baseline survey that their desire to employ technology in future classroom practices was influenced by their school location (whether urban, semi-urban, or rural). Charles and Yidana (2015) discovered that students and teachers in urban schools use ICT more pedagogically than those in semi-urban and rural locations. Teachers in rural locations, on average, suffer more challenges with availability and accessibility of instructional

resources than their counterparts in urban areas. This is because social facilities are concentrated in metropolitan areas. This is why the study will use school location as a moderator variable to see how it affects pre-service teachers' intentions to use technology in the classroom.

2.3.11 Class Size Preference and Teachers' Intention to use Technology

While there is no clear definition of a big class size, it appears that the teaching resources, accommodation, and other facilities that should be available to meet the various requirements of the children in the classroom are significant. For example, Gibbs and Jenkins (1992) claim that if a lecture room has a capacity of 100 students and now has 200 students, the impact of the class size appears to be clear. Teachers with reasonable class sizes have been seen to have better relationships with their students. It may be easier for teachers in such classes to detect difficulties with individual students, propose solutions, provide appropriate feedback, and meet the classroom's different needs (Blatchford and Lai, 2010). Many academics have stated that small and moderate class sizes are usually beneficial, especially when higher-order cognitive skills such as analysis, synthesis, and evaluation are required (Mulryan-Kyne, 2010).

Studies throughout the world have stressed the importance of deploying ICT capabilities to solve the difficulties of big class sizes in school systems (Perraton, 2007; Olakulehin, 2008; Rye, 2009; Maribe and Twum-Darko, 2015). The need to promote active learning in the classroom, increase contact between lecturers and students, and provide real-time feedback to students' questions frequently drives the usage of technology in big classes. Scholars conducted research to see if there was a link between class size and instructors' willingness to employ technology in the classroom. Clickers, according to Barnet (2006), change the fundamental dynamics of classrooms by offering students in packed courses the power of feedback and involvement.

Riffell and Sibley (2004) investigated whether large undergraduate biology classes would encourage the use of web-based instruction for teaching and learning. The teachers were enthused about employing technology in large courses, according to the findings. It improves the quality of student interaction; students' communication with lecturers and fellow students increased considerably; students accessed instructional content more frequently and participated in group discussions. The consequence is that when ICT facilities are available and accessible, teachers dealing

with large classes can use the power of technology to reach out to a large number of students and improve interaction in the classroom. In other words, the intention to employ technology for instructional delivery at all levels of education may be influenced by class size to some extent.

2.4 Appraisal of the Literature

Teachers should be properly prepared to use digital devices to facilitate instructional delivery as the teaching-learning process becomes increasingly technology-based. Teachers in the twenty-first century school system now have the ability to use technology to address the different needs and learning styles of their students in the classroom. Teachers can use technology to appropriately engage students in instructional content both within and outside the classroom. As a result, technology has become a vital instrument in achieving the country's instructional objectives and educational goals. With the advantages afforded by technologies, teachers and students in the classroom may successfully engage and collaborate. The systematic integration of appropriate digital devices for educational delivery is required when using technology in the classroom.

Teachers are occasionally presented with certain crucial factors that may obstruct efficient classroom technology utilisation. These aspects impact the application and usability of digital tools in the educational system to a considerable extent. Scholars from all over the world have conducted research into the various elements that influence how much technology is used by instructors and students in the classroom. In the research, elements such as computer self-efficacy, technical support, attitude, and others have been recognised as important considerations when executing technology integration programs in various regions of the world. Teachers' attitudes and the availability of ICT resources, for example, have been proven to positively connect with the usage of technology in the classroom. Computer phobia, a lack of training, and facilitating environment are all potential barriers to efficient technology use.

However, based on the level of technological development and resource availability in various nations around the world, the existing literature has not adequately emphasised indigenous elements that may influence technology utilisation. In other words, the use of technology by teachers must be contextualized within the

Nigerian educational system. When developing and implementing successful ICT policies in the education system, local variables unique to Nigerian instructors and pupils should be taken into account. As a result, this research adds several elements to the UTAUT model to predict and explain pre-service teachers' intentions to use technology in the classroom in southwest Nigeria.

CHAPTER THREE
METHODOLOGY

This chapter focuses on the research design, the population of the study, sample and sampling technique, instrumentation, the procedure for administration of instruments, and method of data analysis.

3.1 Research Design

This study adopted explanatory sequential mixed methods; the research design type was geared towards generating both qualitative and quantitative data. The research was carried out in three stages:

Stage One: This is the contextualising stage. At this stage, qualitative data was obtained through a preliminary investigation carried out by the researcher at one college of education and one university in South-West Nigeria: Adeniran Ogunsanya College of Education, Ijanikin, Lagos State, and University of Ibadan, Oyo State. Fifty-nine pre-service teachers were interviewed for the baseline study. There were thirty-six (36) respondents from the college of education (7 respondents from school of Arts and Social Science, 8 from school of Education, 7 from school of Science, 7 from school of Languages and 7 from school of Vocational Education) and twenty-three (23) respondents from the university (4 respondents from Department of Arts and Social Science, 4 from Educational Management Department, 3 from Special Education Department, 4 from Adult Education Department, 4 from Science and Technology Education Department and 4 from the Department of Library and Information studies) The respondents from the college of education were tagged PIG 1, while those from the university were tagged PIG 2.

The responses generated from the pre-service teachers were transcribed, thematically analysed and used to generate local variables with which the model was built, which form the basis for the research. The new model is 'The Extended UTAUT Model', established to examine the level of intention of pre-service teachers to teach with technology within the context of the Nigerian educational system. Secondly, the model was built with the combination of the variables in the original UTAUT model and those generated from the preliminary investigation.

Report on the Organised Preliminary Investigation and Focus Group Discussion

Preliminary investigations to find out factors that were germane to teachers' intention to teach with technology in Nigeria other than UTAUT variables were carried out between the months of July and August 2018. One university (University of Ibadan) and one college of education (Adeniran Ogunsanya College of Education, Ijanikin, Lagos) were used for the baseline study. Thirty-six (36) participants were randomly selected from the college of education, while twenty-three (23) participants were selected from the university, making a total of fifty-nine (59) participants. The respondents from the college of education were tagged PIG 1, while those from the university were tagged PIG 2.

This report summarises the key findings from two preliminary investigation groups (PIGs). The preliminary investigation was carried out in one university and one college of education in South-West Nigeria. The PIG participants cut across arts and social sciences, sciences, languages, education and vocational education departments from both the college of education and the university used for the study. The discussion revealed that most of the participants believed that teaching with the aid of technology would lead to the achievement of instructional objectives. Most of the participants intended to teach with technology in their future classrooms because teaching with technology reduces stress, aids recall, makes teaching and learning effective, provides greater access to learning materials, aids comprehension, and improves learner-centred instruction.

Technology stimulates students' interest, makes the classroom lively, and enhances practical and independent learning. Three of the participants believed that technology would not help in the achievement of the instructional objectives and did not intend to teach with technology because they believed technology doesn't aid recall the way that copying notes would. Few pre-service teachers also believed that technology can be a distraction in the classroom, technology may malfunction, technology cannot motivate learners, technology cannot teach how calculations are done, technology is not affordable, and there is lack of, or insufficient, technological equipment, and there is poor power supply in the instructional settings.

The participants named the following technological tools that could be used in the classroom: computer, laptop, television, telephone, microphone, social media, public address system, and mobile phones. Others are CCTV camera, audio recorder, video recorder, tablets, speaker, recorder, radio, Ipad, camcoder, audio/visual materials, audio

tape, and video tape. In the same vein, PowerPoint, scanner, recording tapes, printer, print media, Microsoft Word, megaphone, light pen, interactive white board, instructional aids like DVD and cassette player were also mentioned. Conditions that encourage the intention to use technology to teach in the classroom include the age of learners, the location and environment of the school, large classroom size, availability of technological infrastructure, constant power supply, teachers' familiarity with technology and slow assimilation on the part of learners. Conditions that discourage the intention to use technology to teach in the classroom include financial constraints, lack of familiarity with technological tools by teachers, lack of infrastructure, poor power supply, fear of damaging technological devices or disrupting what is done with technology. Others are misuse of technology by students, small class size, rural location of the school, subject to be taught, stereotypes, poor maintenance of equipment, lecturers' lack of skill to use technology due to their seldom usage of it and government policy.

The role of stakeholders in encouraging teaching with technology is the employment of technicians, a reward system for teachers that teach with technology, provision of infrastructure, and provision of uninterrupted power supply. Other roles to be performed by stakeholder are employing competent teachers, paying attention to the welfare of teachers, subsidising the cost of technological tools and organising seminars and workshops to equip teachers with needed skills and knowledge to teach with technology. On whether the use of technology could help to achieve instructional objectives in classroom practices, almost all the participants believed and agreed that technology could help in achieving instructional objectives in their future classrooms. The participants affirmed the importance of technology in achieving instructional objectives for the following reasons:

Stress Reduction

A lot of the participants were of the view that technology helped to reduce the stress of teaching. Participants in PIG group 1 and 2 declared that technology reduces teachers' stress. Participants in PIG 1 believed that technology enhances individualised instruction and thereby gives teachers lesser work to do. Participants in both groups also believed that technology makes learning and teaching easier and faster. Some of the participants also posited that technology saves time by making teaching and learning faster, smooth and simple.

Aids Recall

Most of the participants believed that using technology in instructional delivery aids recall. A male participant from PIG 2 stated that:

'With technology, anything the learners learn sticks in their memories.'

PIG 1 participants posited that technology aids the recall of learnt materials. The participants believed that since technology involves a visual aspect and students' engagement, it aids remembrance. One of the participants in PIG group 1, a female, communicated this view plainly:

"*Seeing is believing; what you see, you remember."*

Participants in both PIG groups 1 and 2 believed that technology makes learning stay permanent and aids fast remembrance. The participants posited that students retain more knowledge with technology. Some of these participants believe that this is because technology involves the participation of students.

Effective Teaching

Technology in instructional delivery will lead to the achievement of instructional objectives because the use of technology in teaching leads to effective teaching. Participants in PIG 1 stated that technology makes teachers' work efficient. PIG 2 participants posited that it makes teaching easier and faster. They believed that although teaching without technology can be effective, technology makes teaching more effective. One of the participants in PIG 1 (a male) argued that:

"*Technology is not only a source for effective teaching and learning; it also gives room for teachers to express themselves more than with textbooks."*

Fast Learning

Some of the participants were of the view that technology makes learning fast. This would lead to the ability to complete a syllabus not only effectively, but also on time. Participants in PIG 1 and 2 believed that technology aids fast learning. One of them, a female, attested to this by saying:

"*Pupils in nursery classes learn fast due to the videos they watch in their classrooms; they sing, dance and do all sorts of things like that. It makes them learn faster".*

Participants agreed that technology makes learning easier and faster.

Effective Learning

Some of the participants were of the view that technology makes learning effective. Participants in PIG 1 and 2 believed that technology simplifies learning and makes learning easier and comfortable for students. To them, technology helps students to learn.

Access to Learning Materials and Facts Broadens Student Knowledge

Technology grants unprecedented access to more learning materials and facts for both students and teachers. Participants in PIG 1 stated that technology helps both teachers and learners get some facts from the Internet. In addition, participants in PIG 2 believed that technology helps teachers to get more facts and knowledge about a subject matter. According to a female participant in PIG 2:

> "Students can gain more from technology because there is a lot of materials that can be gotten from the Internet and shown to learners, even though those things could not be brought to class physically. Examples are cars, lorries, aeroplanes."

Technology, according to PIG 1 and 2, gives students diverse knowledge of the concept being taught. In agreement with these participants, PIG 2 participants posited that, with technology, students become vast in the topic taught, and it develops students intellectually.

Comprehension

Most of the participants attested that technology aids comprehension. Participants in PIG 2 believed that technology makes learning easier to understand while those of PIG 1 believed that technology allows for easy assimilation. They also believed that technology aids proper understanding because technology can help show the learning materials (for example, animals) like a real and concrete object. A female participant among the PIG 1 stated:

"You know, you can search for pictures of real objects like animals from the Internet and show them to your students in the classroom; they will just look real to them."

Learner-Centered Teaching

Participants believed that technology helps to create a learner-centered classroom. Participants in PIG 2 believed that using technology involves the participation of students and makes teaching and learning learner-centred. At the same

time, those in PIG 1 were of the view that technology gets students involved in the teaching and learning process.

Stimulates Student Interest/Lively Classroom

The use of technology will create a lively classroom and help the students to be interested in learning. PIG 1 participants posited that the use of technology in teaching will stimulate the interest of learners. According to participants in PIG 2, technology arouses students' interest to learn. Participants in PIG 1 also believed that technology makes learning fun as students find pleasure in using technology.

Enhances Practical and Independent Learning

The use of technology in teaching has been said to make learning practical and enhance independent learning. Participants in PIG 1 and 2 thought that technology makes learning real or more concrete because teachers can upload pictures of real objects and display them to students, and learners get exposed to real-life examples and experience. On independent learning, participants in PIG 1 believed that technology helps students to research and learn things ahead of class meetings. In their own view, PIG 2 participants believed that technology enables students to learn independently. Participants of PIG 2 stated that technology encourages individualised learning and notes could be sent to students. At the same time, they can download and read them through mobile phones anytime.

Technology is Indispensable

Most of the participants attested to the necessity of teaching with technology. These participants believed that for students to be able to survive in this technological world or era, it is crucial to teach them with technology. Participants in PIG 1 posited that technology rules the world. A male among them stated:

"Technology rules the world, and we cannot afford to do away with it. Therefore, for me, I would teach with technology."

Participants in PIG 2 asserted that, in the near future, technology would become more advanced and indispensable. A male among them said:

> "The world grows day by day, and it is turning into a global village. Technology will become more advanced by the day, so I intend to use technology in future because it is indispensable."

The participants held the view that technology is the best to use in teaching the 21st century learners.

Exposure to Technology

Another reason some participants believed that teaching with technology would lead to the achievement of instructional objectives is that students are already exposed to technology. Participants in both PIG 1 and 2 stated that students of nowadays are used to, or familiar with, technology. Hence, if the technology is used to teach them, it will be better.

Technology does not help to achieve Instructional Objectives

One of the participants in PIG 1 was of the view that technology does not help to achieve the instructional objectives. A male participant believed that technology does not aid recall. The participant said:

"Some students easily forget what they see through technology. But if they had copied notes, they would have referred to the notes for remembrance from time to time."

This participant is of the view that copying notes is a better way of aiding students' remembrance than teaching with technology. Two participants in PIG 1 were also of the opinion that technology may malfunction and, as a result, teaching with technology cannot achieve the instructional objectives. These participants posited that technology might get spoilt at any time. As one of them, a male participant, put it

"Technology might get spoilt at any time, thereby making some students found wanting in their work while others might have finished."

Teaching with technology will not achieve instructional objectives, according to a male participant in PIG 2, because technology serves as a distraction to students. He said

> "With technology, students would be distracted. They would be playing with the technology at their disposal, using it to do other things like watching films instead of learning with it."

Participants in PIG 1 and 2 cited the absence of power supply, erratic electricity supply, lack of funds, lack of infrastructure or insufficient infrastructure as reasons for their position on teaching with technology. The PIG 1 and 2 participants stated that technology is not available in many schools; and where it is, there may be no electricity to power it or no money to power generators.

The Intention to Use Technology for Teaching

On whether pre-service teachers intend to teach with technology, most of the participants intend to use technology for teaching in the future. These participants cited various reasons for it. For instance, technology enhances practical learning. Participants of PIG 1 and 2 said technology makes learning look real. They intend to use technology because of greater and easy access to learning materials**.** PIG 2 participants intend to use technology in their future classrooms because it aids recall. PIG 1 posited that technology makes students easily remember what they were taught, and PIG 2 participants believed that with technology, learning remains permanent. A male among the participants stated:

"With technology, anything the learners learn sticks in their memories."

Participants in PIG 1 intend to use technology because it encourages independent learning, as students can use technology to research ahead of the class and are enabled to read more on their own. A lot of the participants were of the opinion that technology will reduce the stress of the teaching-learning process and, therefore, intend to use technology in their future classrooms. Participants in PIG 1 and 2 believe that technology:

makes teachers' work easier and makes lectures easier for teachers to deliver.

Participants in both groups posited that if students have their cell phones with them or computers, technology simplifies teaching and learning, and reduces teachers' stress. PIG 2 participants stated that technology would make teaching very easy; it enhances individualised instruction, thereby giving teachers less work to do. PIG 1 participants stated that technology reduces stress and saves time. According to participants in PIG 2, technology reduces the stress of having to copy notes, as notes could be sent to students while they download and read them on mobile phones anytime. Thus, technology can make learning easier. Participants also intend to use technology because they believed it makes teaching effective. Participants of PIG 1 and 2 intend to use technology because technology is indispensable. A male participant from PIG 2 stated:

> "The world grows day by day, and it is turning into a global village. Technology will become more advanced by the day, so I intend to use technology in future because it is indispensable."

PIG 1 participants stated that it is important to use technology. A male participant from PIG 1 said:

"We are in the modern era and, in this era, everything revolves around technology; therefore, we have to use it."

Those in PIG 1 intend to use technology because it fosters students' interest, making students pay more attention to their work. PIG 2 participants intend to use technology because students will gain knowledge on how to use technological tools and because students are already exposed to, or familiar with, technology and should, therefore, be taught with technology. The participants intend to use technology because it aids comprehension. Students can understand better if technology is used to explain some content, and technology makes students understand and assimilate what was taught. Participants also intend to use technology because it will facilitate effective teaching and audibility in a large class, it simplifies teaching methods and it aids effective teaching where students are involved in the teaching-learning process and teachers serve as only facilitators or guides.

Intending not to Use Technology

Two of the participants of PIG 1 believed that technology cannot motivate learners. The researcher raised a poser on whether the participants believed that technology could be used to motivate learners; one of them, AB, said:

> "No! Teachers need to use their body gestures and language to motivate learners, which technology cannot do. Body language and gestures are natural, while technology is artificial. It cannot serve the purpose well."

Other reasons for not intending to use technology are that technology is not affordable, and some aspects of teaching can be understood only by explanation.

The researcher raised another poser on whether they believe in teaching with body language rather than using technology. The other participant, CD, said:

> "Quite simple, all fingers are not equal; technology is not quite affordable for some people. So, if you teach with technology, there are some aspects you will want your students to take their cue from you. You have to make sure that all students have the technology, but fingers are not equal. You can't force their parents to buy technology for

them because you don't know their purses. So, use your body gestures and language in teaching."

Another poser was raised by the researcher on what will happen if the technology in question is available. Participant CD replied:

> "Still use your body gestures. For instance, if your students try to remember what you taught them in class, they will remember that, 'Ha! The teacher did like this while explaining'" (that is, the way the teacher demonstrated while he was explaining).

The duo also believed that technology would replace teachers and thereby lead to unemployment.

"This is a belief that is erroneous because technology is meant to assist the teachers in achieving instructional objectives and not replace teachers," said one participant, EF, a male. He continued:

> "I disagree because right from inception, technology and education have to go hand-in-hand. If you say you are not using technology, it means you are drawing yourself backward because the world is becoming a global village, and there is no child of nowadays that will not be excited by learning with technology."

Identifying Technological Tools that could be used in Teaching

The participants were asked to mention technological tools known to them, that could be used for teaching. The following technological tools were mentioned: Projector, Computer, Laptop, Television, Telephone, Microphone, Social Media, Public Address System, Mobile Phone, CCTV Camera, Audio Recorder, Video Recorder, Tablets, Speaker, Recorder, Radio, Ipad, Camcorder, Audio/Visual Materials, Audio Tape, Video Tape , Use of PowerPoint, Scanner, Recording Tapes , Microsoft Word, Megaphone, Light Pen, Interactive White Board, DVD, Cell Phones, Cassette Player, Android Phones

Conditions that Encourage the Intention to Use Technology in Teaching

Age of Learners

Few of the participants believed that the age of learners is a condition that will prompt the use of technology for teaching. They believed that technology should be used more for learners in kindergarten and nursery and primary schools. Some of the participants in PIG 2 stated that:

"Kindergarten children love pictures and videos, and could easily learn from there."

Also, one of the participants in PIG 1, a female, posited that:

"It is better we use technology to teach the beginners; that is, nursery and primary classes, for proper remembrance."

The Location and Environment of a School

Participants also believed that the location of a school can encourage the use of technology. Participants in PIG 1 and 2 will use technology to teach if the environment or community is civilised technologically.

The researcher raised a poser, asking whether the participants are sure they will teach with technology if they find themselves in a technologically conducive environment. A female participant from PIG 1, while responding to the poser, said:

> "Why won't I teach with technology if the community where I want to teach is civilised technologically? I mean if there is electricity, Internet, the technology to be used, and if the pupils are familiar with technology, why not?"

Participants in PIG 2 were of the view that if one is in a civilised environment where there is power supply, one will be encouraged to use technology. PIG 1 participants would have to consider the environmental background of learners to teach with technology. Therefore, the location of a school has been strongly linked to the availability and usability of technological infrastructure.

Large Classroom Size

Most of the participants stated that a large classroom size is a prerequisite for teaching with technology. Participants in PIG 1 and 2 are of the opinion that when there is a very large class, technology can be used to communicate effectively to students or

pass the instruction to a large number of students. Therefore, technology could be used to overcome the challenge of having a large number of students.

Availability of Technological Infrastructure and Constant Power Supply

A lot of the participants said if the technological infrastructures are available, they will use technology to teach. PIG 1 and 2 participants stated that the availability of IT equipment and IT materials would make them teach with technology, while participants of PIG 1 wanted availability of recorders, good Internet connection, and enough computers. Participants in PIG 2 didn't make mention of specific technologies. Participants of this group are of the view that if technological tools are available in schools, they will use it to teach.

Participants of PIG 1 stated that they will teach with technology if there is a regular supply of electricity.

Technological Know-How/Familiarity with Technology

Participants in both groups believed that being familiar with technology and knowing how to operate technological tools will encourage them to teach with technology. Participants in PIG 1 and 2 stated that teachers' knowledge about technology and level of exposure to technology would make them use technology to teach. One of the participants in PIG 1, a female, remarked that:

> "If one, as a teacher, knows how to operate technological tools to teach, one will definitely use it. But many people don't use them because they don't know how to operate them."

Participants in PIG 1 stated that technology will be used to teach if teachers know how to use the technology effectively and if teachers are trained to make use of technological equipment. PIG 2 participants stated that if teachers find using technology easy and simple, they will use it.

Slow Assimilation/ Last Resort

Few participants also stated that they will use technology to teach if students have slow assimilation or, as a last resort, when all other teaching methods have failed. PIG 1 participants stated that when some students do not assimilate easily or fast and

the teachers perceived that their students seem not to understand what they are teaching them, they can use technology to teach.

Other conditions that will encourage the use of technology by teachers, according to the two groups, include: to reduce the stress of teachers and to make teachers' work easier and faster; cost-effectiveness of the technology. Participants in both groups stated that if the technology is cost-effective, it will be used for teaching.

Access to Technological Tools

Participants in PIG 1 and 2 stated that if there is easy access to the technological tools, teachers will teach with technology. One of the participants in PIG 2, a female, expressed that:

> "Teachers will teach with technology if they can easily access those technological tools; I mean, if those tools are at their disposal anytime, they will use them. You know, in some schools, there are computers; but they are locked up by those in charge of them, thereby blocking people's access to those things. If people, I mean both teachers and learners, are allowed access to those gadgets, they will use them."

Lack of Instructional Materials

Participants in PIG 1 are of the view that if there are no physical instructional materials to be used, one needs to search online.

Conditions That Discourage the Intention to Use Technology in Teaching

Financial Constraints

A lot of the participants were of the view that financial constraints were a factor that discouraged the use of technology in teaching. Participants in PIG 1 and 2 posited that lack of funds discouraged teaching with technology while some were also of the opinion that the government did not provide the financial support needed for technological teaching, while teachers and schools lack fund to procure these technological tools.

Participants were also of the view that the high cost of equipment, technological tools or facilities discourages the use of technology in teaching. This is a view shared by the participants in PIG 1. Participants in PIG 2 believed that the high cost of taking students

out for excursions also discourages teaching with technology. Participants in PIG 1 pointed out that the high cost of maintaining technological tools discourages teaching with technology.

Lack of Trained Personnel

Some of the participants in PIG 1 and 2 posited that lack of trained personnel, and when teachers' skills to use technology are not updated, will discourage teachers from using technology.

Lack of Infrastructure and Poor Power Supply

Most of the participants stated that the lack of infrastructure and power supply are factors that discourage teaching with technology. Participants in PIG 1 and 2 believed that lack of power supply and irregular power supply are conditions that do not allow for teaching with technology. They also stated that lack of technological equipment and inadequate supply of technological tools make teachers unable to teach with technology.

Fear

Fear of mistakenly damaging technological tools also discourages teachers from using available technology to teach. Participants of PIG 1 and 2 stated that if a teacher is afraid of spoiling the technology or distorting the work he is doing with the technology, he or she will not use it.

Misuse of Technology

The abuse of technological tools by students is a factor that participants believe will discourage teachers from teaching with technology. Technology in such situations serves more as a distraction than an advantage to the students. Participants in PIG 1 believed that teachers will be discouraged from using technology if they notice that some students watch pornographic materials or search for things other than educational materials.

Small Class Size

Few of the participants in PIG 1 believed that if the class size is small, teachers will not need to use technology.

Location of Schools/Unconducive Environment

Some of the participants in PIG 1 and 2 posited that teachers whose schools are in rural areas where there is lack of infrastructure and electricity are less likely to use technology. Also, if the school environment is not conducive, for example, in a noisy environment, teachers are less likely to use technology.

Subject to be Taught

Few of the participants also believe that technology is not needed to teach certain subjects. Few participants in PIG 1 are of the opinion that subjects like home economics do not need technology for teaching.

Stereotypes

Some of the participants of PIG 1 and 2 identified teachers who have negative attitudes towards doing things in new ways; they may try to resist teaching with technology. These teachers have a mindset that is not receptive to change. The participants stated that some teachers like to maintain the status quo by saying their teachers did not teach them with technology.

Poor Maintenance of Equipment

Poor maintenance of equipment is also a factor that participants believed discourages the use of technology for teaching. Participants of PIG 2 posited that if the equipment or materials to be used are faulty, teachers will be unable to teach with technology. Participants in PIG 1 are of the opinion that when there is no proper management of equipment, teachers will be unable to teach with technology.

Government Policy

The policy of the government is believed to affect the tendency to teach with technology either positively or negatively. PIG 2 participants posited that lack of governmental support and technologically driven teaching policies by the government discourage the use of technology.

From the preliminary investigation, the most mentioned variables were chosen and were added to the original UTAUT variables to build the new model. Those variables are: Technology Familiarity, Technological Anxiety, Attitude Towards

Technology Use and Accessibility to Technological Resources. School Location and Classroom Size were also considered as moderating variables

Stage Two

This is the implementation or assessment stage where the model was used to measure the intention to use technology among Nigerian pre-service teachers. The variables in the extended UTAUT model were measured on pre-service teachers in public colleges of education and universities in southwest Nigeria.

The study investigated how the UTAUT model, extended with technology familiarity, technological anxiety, attitude towards technology use, accessibility to technological resources and demographic factors, predicts the intention to teach with technology among pre-service teachers in southwestern Nigeria.

3.2 Population

The target population for this study were 22,978 final year pre-service teachers from six colleges of education and six universities offering educational courses in southwest Nigeria. The states are Oyo, Osun, Ogun, Lagos, Ekiti, and Ondo. One university and one college of education were selected in each state.

3.3 Sample and Sampling Technique

A multi-stage sampling procedure was adopted for the study. First, one public university offering education courses was purposively selected in each state, irrespective of the ownership. In cases where there were more than one university that fit into the criterion in the same state, random sampling was used to select one. Secondly, 400 level students at the faculties of education from the selected universities were purposively selected due to their exposure to teaching practice and experience in technology usage. The period for lecture of a compulsory 400 level course was targeted by the researcher and research assistants, for the administration of the instrument.

Similarly, one public college of education was purposively selected from each state in southwest Nigeria, irrespective of its ownership. In states that have more than one public college of education in the criterion, random sampling was used to select one. Secondly, 300 level students in each of the schools from the selected colleges of education were purposively selected due to their exposure to teaching practice and experience in technology usage. The period for lecture of a compulsory 300 level course

was targeted by the researcher and research assistants, for the administration of the instrument.

3.4 Research Instruments

The research instruments used in this study include:

i. Performance Expectancy Scale
ii. Effort Expectancy Scale
iii. Social Influence Scale
iv. Facilitating Condition Scale
v. Technology Familiarity Scale
vi. Technological Anxiety Scale
vii. Attitude towards Technology Scale
viii. Accessibility to Technological Resources Scale
ix. Intention to Use Technology Scale
x. Focus Group Discussion (FGD) Guide

To assess the construct validity and reliability of the scales, the scales were trial-tested. The instruments were pilot-tested on 252 pre-service teachers: 150 pre-service teachers from Kwara State College of Education, Ilorin, and 102 pre-service teachers from the University of Ilorin, Ilorin, Kwara State, to generate data for the reliability test. These 252 pre-service teachers were not part of the main study population.

3.4.1 Performance Expectancy Scale

This scale was adopted from the Performance Expectancy Scale in the original UTAUT constructs. It contains nine items, which are measured on 4-point Likert type scale response options of strongly agree, agree, disagree and strongly disagree. A reliability index of 0.8 was obtained through internal consistency using Composite Reliability which shows that the instrument is reliable for this study.

3.4.2 Effort Expectancy Scale

This instrument was adopted from the Effort Expectancy scale in the original UTAUT constructs. It contains seven items which are measured on 4-point Likert type scale response options of strongly agree, agree, disagree and strongly disagree. A reliability index of 0.7 was obtained through internal consistency using Composite Reliability which shows that the instrument is reliable.

3.4.3 Social Influence Scale

This scale was adopted from the Social Influence Scale in the original UTAUT constructs. It consists of seven items which reflect the prevailing circumstances in the Nigerian educational system. The items are measured on 4-point Likert type scale response options of strongly agree, agree, disagree and strongly disagree. A reliability index of 0.7 was obtained through internal consistency using Composite Reliability.

3.4.4 Facilitating Condition Scale

This is an eleven-item scale adopted from the Facilitating Condition Scale in the original UTAUT constructs. The items are measured on 4-point Likert type scale response options of strongly agree, agree, disagree and strongly disagree. A reliability index of 0.8 was obtained through internal consistency using Composite Reliability which shows that the instrument is reliable for the study.

3.4.5 Technology Familiarity Scale

This instrument was designed to measure the technology familiarity of pre-service teachers. It contains 11 items measured on a 4-point scale of very familiar, familiar, less familiar, and not familiar. A reliability index of 0.9 was obtained through internal consistency using Composite Reliability.

3.4.6 Technological Anxiety Scale

The technological anxiety scale for this study was adopted from the computer anxiety scale by Heinssen, Glass, and Knight (1987). The scale has twelve items measured on 4-point scale response options of strongly agree, agree, disagree, and strongly disagree. A reliability index of 0.8 was obtained through internal consistency using Composite Reliability. Also, word like "Computer" was changed to "Technology" and some sentences were re-phrased, although they gave the same contextual meaning.

3.4.7 Attitude towards Technology Scale

The attitude towards technology scale was adapted from the Computer Attitude Scale (CAS), developed by Selwyn (1997). The computer attitude scale by Selwyn (1997) contains twenty-one items, out of which six items address affective component, five items address perceive usefulness component, six items address perceive control component while four items address behavioural intention component. However, the one used for this study contains sixteen items, out of which three items address affective component, five items address perceive usefulness component, three items address perceive control component while five items address behavioural intention component. The word "computer" that was used in the instrument was changed to "technology" in this study while the pronoun "I" was changed to "teachers". Sexton, King, Aldridge, and Goodstadt-Killoran (1999) reported that the CAS possessed a high-reliability coefficient of 0.90. However, the instrument was revalidated through a pilot study conducted by the researcher. The reliability index of 0.8 was obtained via internal consistency using Composite Reliability.

3.4.8 Accessibility to Technological Resources Scale

The scale contains eight items. It was developed to measure pre-service teachers' accessibility to technological resources. The instrument is measured on 4-point Likert-type scale response options. A reliability index of 0.8 was obtained through internal consistency using Composite Reliability.

3.4.9 Intention to Use Technology Scale

The intention to use technology scale used for this study contains ten items which was adopted from the work of Hartshorne and Ajjan (2009), who used a survey to examine students' decisions to adopt web 2.0 technologies. The content was modified by changing the 'web 2.0' to 'technology', also, the beneficiary of the scale was changed from 'students' to 'teachers' in order to reflect the population and the intention to use technology. A reliability index of 0.7 was obtained through internal consistency using Composite Reliability.

3.4.10 Focus Group Discussion Guide

Focus group discussion questions for the pre-service teachers were developed by the researcher. It contains five-item interview questions, ranging from whether pre-service teachers think using technology for instructional delivery could help them

achieve instructional objectives in their future classrooms and to state reasons for their answers; to whether pre-service teachers intend to teach with technologies in their future classrooms and to state reasons for their answers. The pre-service teachers were also asked to mention technological tools known to them that could be used in the teaching-learning process.

Conditions that would encourage or discourage teachers' intention to teach with technology were also enumerated. What the pre-service teachers think the educational stakeholders such as government, parents and others could do to stimulate teachers' intention to teach with technology was also discussed. Pre-service teachers were asked whether there had been occasions when their lecturers used technology to simplify difficult concepts for them and the concepts became very clear to them, and whether they intend to teach with technology based on that experience. Pre-service teachers were asked to itemise the roles played by their lecturers in the course of their training, which either stimulate or discourage their interest from wanting to teach with technology in their careers in future. Pre-service teachers' responses were written by the repertoire for each group. To ensure that no data was lost during the study, pre-service teachers' discussions and comments were also recorded. At the end of the exercise, both the written and audio formats were transcribed by the researcher for content analysis and used to generate variables for this study.

3.5 Validation of the Instruments

All the instruments described were given to two experts in the Department of Science and Technology Education and two test developers to ascertain whether the instruments could measure what they were designed to measure. Based on the experts' suggestions, some items that were considered irrelevant were deleted, while others were reviewed.

Construct Validity of the Scales

To assess the construct validity of the scales, Trochim and Donnelly's (2006) construct validity framework was adopted. According to Trochim (2015), the construct validity framework is dependent on two major indicators: convergent and discriminant validity. According to the author, these two indicators must be fulfilled before a scale can possess construct validity.

Convergent Validity

This consists of three assessment procedures. These are:

i. Item reliability
ii. Reliability of each construct
iii. The average variance extracted

Hair, Black, Babin, and Anderson (2010), and Afari and Khine (2017) suggested that item reliability is assessed by its respective factor loading on the underlined construct. Hair et al. suggested that an item is considered reliable if its factor loading is greater than or equal to 0.5. Furthermore, a construct is reliable when it returns a value of 0.7 or above the reliability coefficient (Nunnally and Bernstein, 1994). Several measures of reliability exist. Examples are Cronbach Alpha and Composite Reliability (also called reliability omega), among others. In this study, the composite reliability is used instead of Cronbach Alpha because Cronbach Alpha tends to underestimate scale reliability when the scales are not essentially tau-equivalent (Meyer 2010). According to Afari (2013), reliability omega is expressed as:

$$CR = \frac{(\sum \lambda)^2}{(\sum \lambda)^2 + (1 - \lambda^2)}$$

Where λ is the item loading, the final criterion of convergent validity, average variance extracted is a measure that indicates the amount of variance in an item that is explained by the underlined construct (Fornell and Larcker,1981). Nunnally and Bernstein (1994) recommended a minimum value of 0.5 for estimated average variance extracted to be considered substantial. Mathematically, the average variance extracted is expressed as:

$$AVE = \frac{\sum \lambda^2}{\sum \lambda^2 + (1 - \lambda^2)}$$

Discriminant Validity

Discriminant validity assesses the degree to which a construct of a scale differs from one another. According to Barclay, Higgins, and Thompson (1995), discriminant validity can be assessed by applying two analytical procedures popularly called Larcker Criterion. The first criterion of discriminant validity is that the square root of the average variance extracted for each construct should be larger than the inter-construct correlation. The second criterion is achieved when the loading of an item within a construct is greater than its loading on other constructs in the model. Furthermore, the

Heterotrait-Monotrait Criterion (HTMT) has also been suggested to assess discriminant validity better (Henseler, Ringle and Sarstedt 2015; Hamid, Sami, and Sidek, 2017). These researchers found Heterotrait-Monotrait Criterion (HTMT) relatively better than the Larcker Criterion in assessing the discriminant validity of the scale. Therefore, in this study, Heterotrait-Monotrait Criterion (HTMT) was used for the discriminant validity of the instrument. According to Henseler (2015), a scale is considered to have discriminant validity if the HTMT ratio for all the sub-skill of the construct is less than or equal to 0.9. The result of the assessment of the construct validity and reliability of the scales that were used in this study is presented as follows:

Table 3.1 shows the construct validity and reliability of Performance Expectancy. It should be noted that the Heterotrait-Monotrait Criterion (HTMT) for Performance Expectancy is 0.8. it is less than 0.9 which is the bench mark, this indicates that the construct is valid.

Table 3.1: Assessment of the Construct Validity and Reliability of Performance Expectancy

SCALE	Subscale	Item	Loading	Composite	Ave	HTMT
PERF EXP		pe_1	0.5	0.8	0.8	
		pe_2	0.6			
		pe_3	0.6			
		pe_4	0.6			
		pe_5	0.7			
		pe_6	0.5			
		pe_7	0.6			
		pe_8	0.6			
		pe_9	0.5			
		pe_10	0.6			

Table 3.2 shows the construct validity and reliability of Effort Expectancy. It should be noted that the Heterotrait-Monotrait Criterion (HTMT) for Effort Expectancy is 0.7. It is less than 0.9 which is the bench mark, this indicates that the construct is valid.

Table 3.2: Assessment of the Construct Validity and Reliability of Effort Expectancy

SCALE	Subscale	Item	Loading	Composite	Ave	HTMT
EFFORT EXP		ee_1	0.5	0.8	0.7	
		ee_2	0.5			
		ee_3	0.6			
		ee_4	0.5			
		ee_5	0.5			
		ee_6	0.5			
		ee_7	0.7			

Table 3.3 shows the construct validity and reliability of Social Influence. It should be noted that the Heterotrait-Monotrait Criterion (HTMT) for Social Influence is 0.7. It is less than 0.9 which is the bench mark, this implies that the construct is valid.

Table 3.3: Assessment of the Construct Validity and Reliability of Social Influence

SCALE	Subscale	Item	Loading	Composite	AVE	HTMT
SOCIAL	INFL	si_1	0.5	0.7	0.7	
		si_2	0.5			
		si_3	0.5			
		si_4	0.3			
		si_5	0.3			
		si_6	0.5			
		si_7	0.5			

Table 3.4 shows the construct validity and reliability of Facilitating Condition. It should be noted that the Heterotrait-Monotrait Criterion (HTMT) for Facilitating Condition is 0.8. It is less than 0.9 which is the bench mark, this indicates that the construct is valid.

Table 3.4: Assessment of the Construct Validity and Reliability of Facilitating Conditions

SCALE	Subscale	Item	Loading	Composite	Ave	HTMT
FAC CON		fac_1	0.5	0.8	0.8	
		fac_2	0.6			
		fac_3	0.7			
		fac_4	0.6			
		fac_5	0.5			
		fac_6	0.6			
		fac_7	0.5			

Table 3.5 shows the construct validity and reliability of Technology Familiarity. It should be noted that the Heterotrait-Monotrait Criterion (HTMT) for Technology Familiarity is 0.9, which is equal to the bench mark. This indicates that the construct is valid.

Table 3.5: Assessment of the Construct Validity and Reliability of Technology Familiarity

SCALE	Subscale	Item	Loading	Composite	Ave	HTMT
FAM TO TECH		fam_1	0.5	0.9	0.9	
		fam_2	0.7			
		fam_3	0.5			
		fam_4	0.5			
		fam_5	0.6			
		fam_6	0.6			
		fam_7	0.6			
		fam_8	0.5			
		fam_9	0.7			
		fam_10	0.6			
		fam_11	0.7			

Table 3.6 shows the construct validity and reliability of Technological Anxiety. It should be noted that the Heterotrait-Monotrait Criterion (HTMT) for Technological Anxiety is 0.8. It is less than 0.9 which is the bench mark, this indicates that the construct is valid

Table 3.6: Assessment of the Construct Validity and Reliability of Technological Anxiety

SCALE	Subscale	Item	Loading	Composite	Ave	HTMT	
	TECH						
	ANX_F1	tac_4	0.6	0.8	0.8		
		tac_6	0.6				
TECH							TECH
ANXIETY		tac_7	0.8				ANX_F2
						TECH	
		tac_8	0.5			ANX_F1	0.5
		tac_12	0.6				
	TECH						
	ANX_F2	tac_1	0.6	0.8	0.8		
		tac_2	0.6				
		tac_3	0.5				
		tac_5	0.7				
		tac_9	0.6				
		tac_10	0.6				
		tac_11	0.7				

Table 3.7 shows the construct validity and reliability of attitude towards technology. The Heterotrait-Monotrait Criterion (HTMT) for Attitude Towards Technology is 0.8. It is less than 0.9 which is the bench mark, which shows that the construct is valid.

Table 3.7: Assessment of the Construct Validity and Reliability of Attitude to Technology Use

SCALE	Subscale	Item	Loading	Composite	Ave	HTMT	
	ATT_F1	tat_1	0.5	0.8	0.8		
		tat_4	0.6				
		tat_6	0.6				
ATT TO							
TECH		tat_8	0.7				
		tat_9	0.7				
		tat_10	0.6				ATT_F2
		tat_12	0.6			ATT_F1	0.5
		tat_13	0.6				
	ATT_F2	tat_2	0.6	0.8	0.8		
		tat_3	0.5				
		tat_5	0.6				
		tat_7	0.5				
		tat_11	0.7				
		tat_14	0.5				

Table 3.8 shows the construct validity and reliability of Accessibility to Technological Resources. It should be noted that the Heterotrait-Monotrait Criterion (HTMT) for Accessibility to Technological Resources is 0.8 It is less than 0.9 which is the bench mark. This indicates that the construct is valid.

Table 3.8: Assessment of the Construct Validity and Reliability of Accessibility to Technological Resources

SCALE	Subscale	Item	Loading	Composite	Ave	HTMT
		atr_1	0.6	0.8	0.8	
ACCESS TO TECH RESOU		atr_2	0.7			
		atr_3	0.5			
		atr_4	0.6			
		atr_5	0.5			
		atr_6	0.5			
		atr_7	0.5			
		atr_8	0.6			

Table 3.9 shows the construct validity and reliability of intention to Use Technology. It should be noted that the Heterotrait-Monotrait Criterion (HTMT) for Intention to Use technology is 0.8, it is less than 0.9 which is the bench mark. This implies that the construct is valid.

Table 3.9: Assessment of the Construct Validity and Reliability of Intention to Use Technology

Scale	Subscale	Item	Loading	Composite	Ave	HTMT	
	INT_F1	tit_1	0.7	0.8	0.7		INT_F2
INT TO USE							
TECH		tit_4	0.6			INT_F1	0.6
		tit_6	0.8				
	INT_F2	tit_2	0.7	0.7	0.7		
		tit_3	0.7				
		tit_5	0.5				
		tit_7	0.7				

3.6 Procedure for Data Collection

The researcher obtained a letter of introduction from the Head of Department of Science and Technology Education, the University of Ibadan, before the fieldwork, which was presented to the Deans of Schools and Faculties in each of the selected institutions. The research instruments were administered to the respondents with the help of trained research assistants. These research assistants were orientated on the study's objectives and how to relate, explain and administer the instrument to the respondents for clarity purpose. Secondly, 400 level students at the faculties of education from the selected universities were purposively selected due to their exposure to teaching practice and experience in technology usage. The period for lecture of a compulsory 400 level course was targeted by the researcher and research assistants, for the administration of the instrument. Thereafter, the faculty was stratified into the departments that made up the faculty. In each of the stratum (Departments) convenie nt sampling method was used. In particular the students who were present in each of Department on the day the researcher visited were sampled. The copies of questionnaire administered was 982 and 976 were returned; making 99.4% return rate. Out of the returned questionnaire, 965 were valid for data analysis. In total 982 students were selected from six faculties of education in the selected universities.

Similarly, one public college of education was purposively selected from each state in southwest Nigeria, irrespective of its ownership. In states that have more than one public college of education in the criterion, random sampling was used to select one. Secondly, 300 level students at each of the schools from the selected colleges of education were purposively selected due to their exposure to teaching practice and experience in technology usage. The period for lecture of a compulsory 300 level course was targeted by the researcher and research assistants, for the administration of the instrument. Thereafter, each school was stratified into the departments that made up the school. In each of the stratum (Departments) convenient sampling method was used. In particular the students who were present in each of Department on the day the researcher visited were sampled. The copies of questionnaire administered was 1,360 and 1,351 were returned; making 99.3 percent return rate. Out of the returned questionnaire, 1,333 were valid for data analysis. In total 1,360 students were selected from thirty schools in the selected colleges of education.

Valid for analysis. The fieldwork lasted eight weeks with the following research plan:

Week 1-2: Visiting of the schools and orientation for the research assistants

Week 3-7: Administration of questionnaires

Week 8: Collation of data for analysis

3.7 Method of Data Analysis

Quantitative data were analysed using Pearson's product moment correlation and Partial least square structural equation modelling at $p \leq 0.05$ while qualitative data were thematically analysed using traditional manual approach. The procedure for analysis for PLS-SEM involves four stages: Model Specification, Model Estimation, Model Evaluation and Model Re-specification.

Model Specification: The extended model was developed from the original UTAUT model.

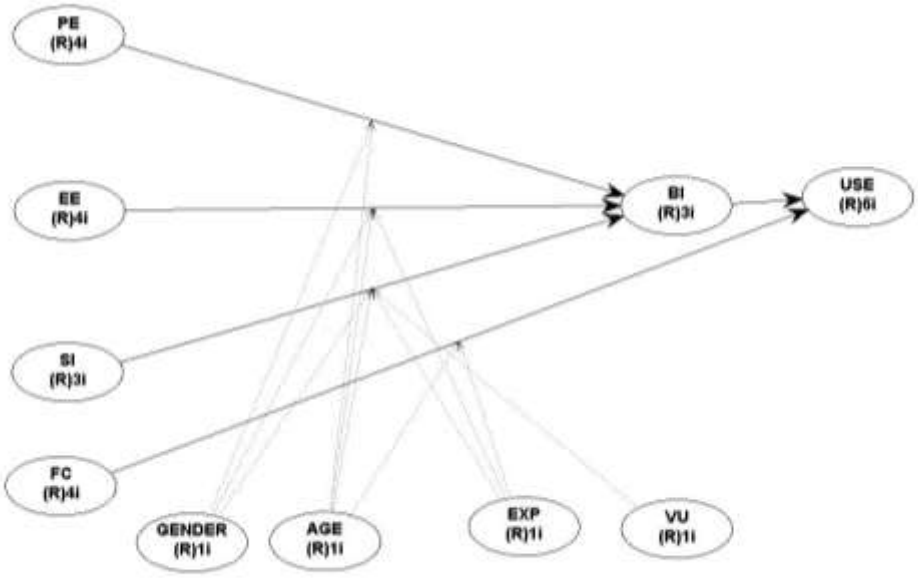

Figure 3.1: The Original UTAUT Model (Venkatesh, Morris, Davies, and Davies, 2003).

Keys:

PE: Performance Expectancy

EE: Effort Expectancy

SI: Social Influence

FC: Facilitating Condition

EXP: Experience

VU: Voluntariness of Use

BI: Behavioural Intention

USE: Use Behaviour

In this study, however, technology "use" is not the focus, so the arrow that was coming from the facilitating conditions was removed because it directly influences the "Use" behaviour in the original UTAUT model.

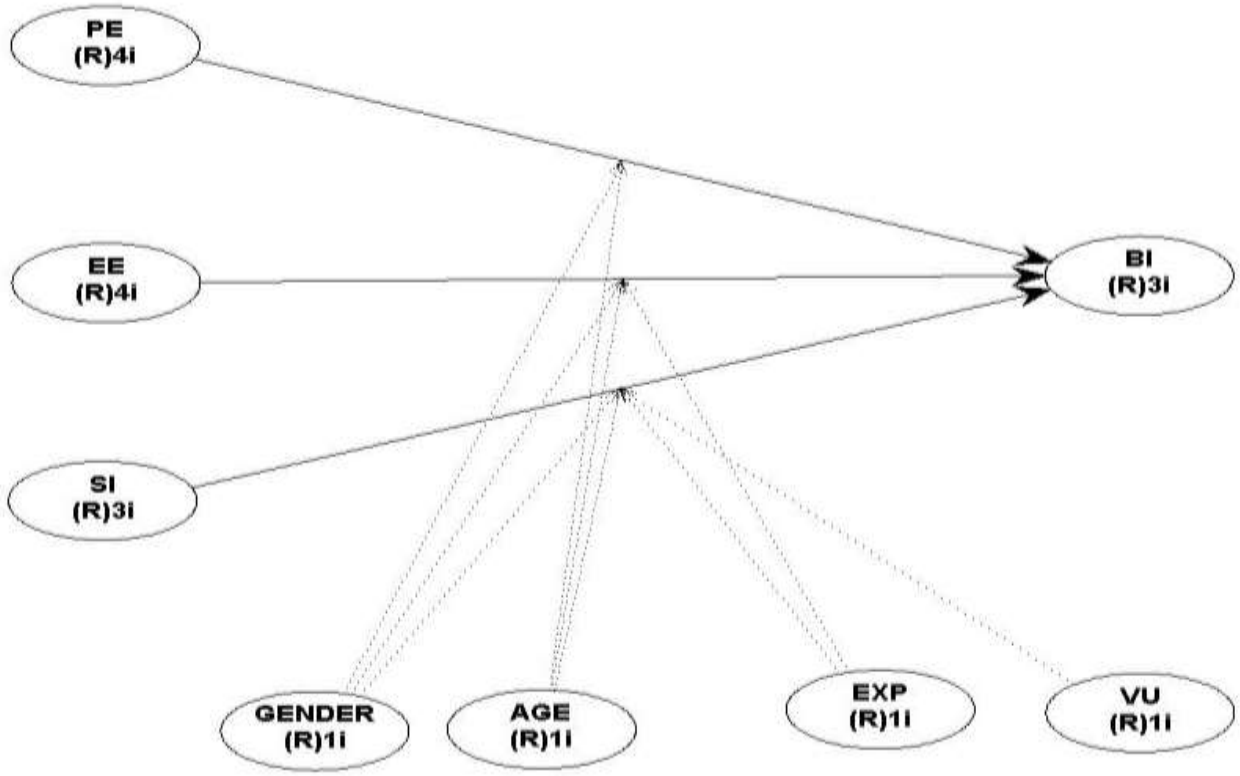

Figure 3.2: The UTAUT Model Without Facilitating Conditions (adapted from Venkatesh, Morris, Davis and Davis, 2003).

Keys:

PE: Performance Expectancy

EE: Effort Expectancy

SI: Social Influence

EXP: Experience

VU: Voluntariness of Use

BI: Behavioural Intention

Due to the peculiarity of Nigeria as a nation, the model was built to explain the intention to use technology and a baseline study was conducted to determine factors that could affect the intention to use technology. The following factors were identified: Technology Familiarity, Technological Anxiety, Attitude towards Technology, Availability and Accessibility to Technological Resources, with School Location and Classroom Size, which were used as moderating variables in the study. It should be noted that Facilitating Condition has been re-introduced in Figure 3.3. This is because Availability of Technological Resources with organisational support was mentioned by the pre-service teachers during the base-line study, among the factors that could influence intention to use technology for teaching. Meanwhile, availability of technological equipment and resources, with organisational support are already embedded in Facilitating Condition, so, Facilitating Condition was re-introduced. Figure 3.3 shows the hypothesised model that describes the interrelatedness of the original UTAUT model and the proposed extension.

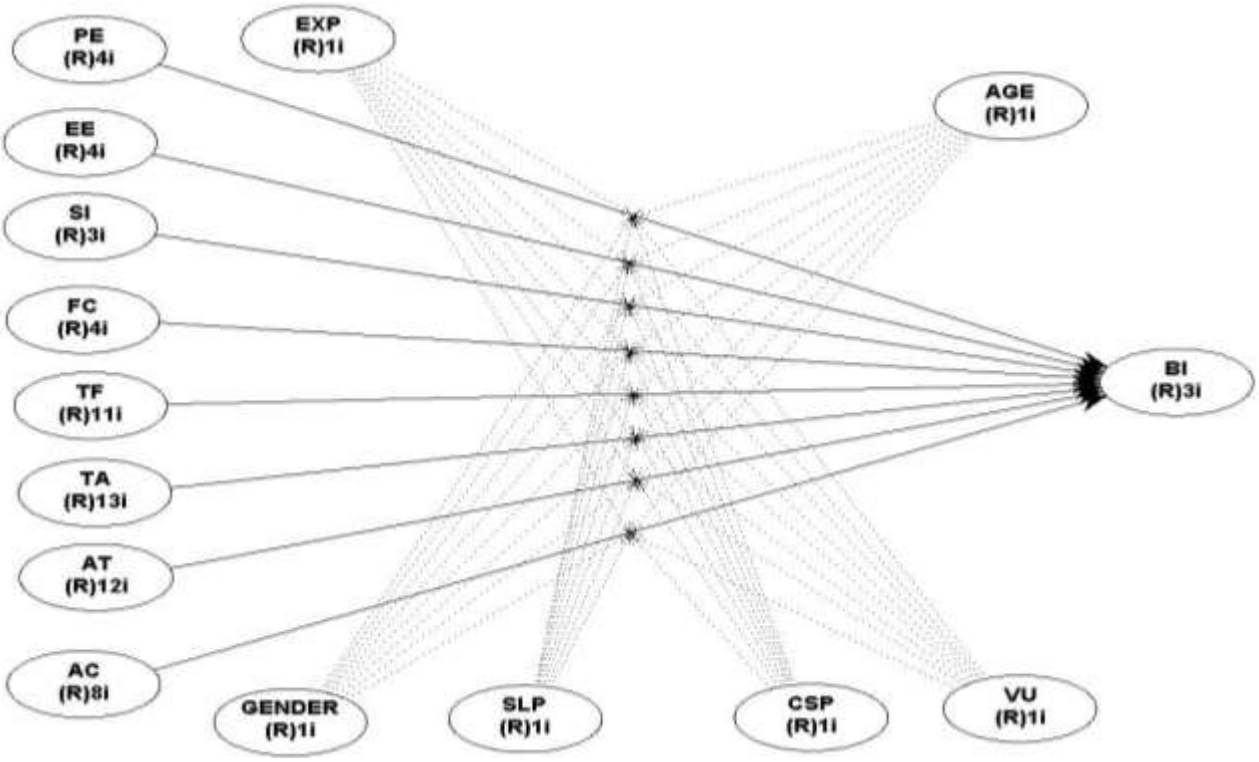

Figure 3.3: The Hypothesised Extended UTAUT Model (adapted from Venkatesh, Morris, Davis and Davis, 2003).

Keys:

PE: Performance Expectancy

EE: Effort Expectancy

SI: Social Influence

FC: Facilitating Condition

TF: Technology Familiarity

TA: Technological Anxiety

AT: Attitude Towards Technology Use

AC: Accessibility to Technological Resources

SLP: School Location Preference

CSP: Classrom Size Preference

VU: Voluntariness of Use

EXP: Experience

BI: Behavioural Intention

Model Estimation: This involves the analysis of the consistency of the hypothesised model with empirical data. For this, the WarpPLS was used and the result is presented at the result section.

Model Evaluation: This deals with the consistency of the hypothesised model with the empirical data. To achieve this, the Kock (2020) benchmark was used. That is, Overall model fit, Measurement model assessment, and Structural model assessment were used.

Overall Model Fit Indicators in Smart PLS: The extent of consistency of the hypothesised extended UTAUT model, with the empirical data, was judged based on Kock (2020). According to Kock, for a model to be considered fit or consistent with empirical data, the estimated: Average block Variance Inflation Factor VIF (AVIF) should be <= 5, ideally <= 3.3; Average full collinearity VIF (AFVIF) should be <= 5, ideally <= 3.3;Tenenhaus Goodness of Fit (GoF) should be at least >= 0.25 for moderate fit and large when >= 0.36; Sympson's paradox ratio (SPR) should be >= 0.7, ideally = 1; R-squared contribution ratio (RSCR) should be >= 0.9, ideally = 1; Statistical suppression ratio should be >= 0.7; Nonlinear bivariate causality direction ratio (NLBCDR) should be >= 0.7; Standardised root mean squared residual (SRMR) should be <= 0.1; Standardised mean absolute residual (SMAR) should be <= 0.1; Standardised threshold difference count ratio (STDCR) should be >= 0.7, ideally = 1; and Standardised threshold difference sum ratio (STDSR) should be >= 0.7, ideally =1.

Measurement Model Assessment: Measurement model assessment determines the adequacy of the items and the scales in the measurement of the constructs or variables in a model. The convergent and discriminant validity of the latent variables in the model were assessed. The result is presented as follows:

Convergent Validity

This consists of three assessment procedures. These are:

i. Item reliability
ii. Reliability of each construct
iii. The average variance extracted.

Hair, Black, Babin, and Anderson (2010), and Afari and Khine (2017) suggested that item reliability is assessed by its respective factor loading on the underlined construct. Hair *et al.* (2010) suggested that an item is considered reliable if its factor loading is greater than or equal to 0.5. Furthermore, a construct is reliable when it returns a value of 0.6 or above the reliability coefficient for the predictive model (Nunnally and Bernstein, 1994). Several measures of reliability exist. Examples are Cronbach Alpha and Composite Reliability (also called reliability omega), among others. In this study, the composite reliability is used instead of Cronbach Alpha because Cronbach Alpha tends to underestimate scale reliability when the scales are not essentially tau-equivalent (Meyer 2010). The final criterion of convergent validity, average variance extracted, indicates the amount of variance in an item that is explained by the underlined construct (Fornell and Larcker,1981). Nunnally and Bernstein (1994) recommended a minimum value of 0.4 for the estimated average variance extracted to be considered substantial for the predictive model.

Structural Model Assessment: To assess the structural model, the standard assessment criterion which should be considered, according to Hegner-Kakar, Richter, and Ringle (2018), includes the blindfolding-based cross-validated redundancy measure or predictive relevance (represented with Q^2) of the endogenous variable(s) in a model and statistical significance of the path coefficients. The Q^2 is a measure that establishes the relevance of the endogenous variables in a model. It is also called the predictive relevance of endogenous variables in a model. An endogenous variable is considered relevant to a model if the Q^2 value is greater than zero. The significance of path coefficients is the certainty with which a variable establishes a causal relationship with another variable. In PLS-SEM, the significance of a path coefficient is measured using the ninety-five percent (95%) bias-corrected and accelerated (BCa) bootstrap confidence intervals. Alternatively, one may revert to the bootstrap p-values. In this study, the bootstrap p-value is used. The result is presented in Table 4.2.

Stage Three

In stage three, twelve sessions of Focus Group Discussion were carried out with the pre-service teachers in order to affirm the authenticity of the earlier factor generated to predict intention during preliminary investigation and also to get more factors that could

predict intention of teachers to use technology in Nigeria. The outcome of the discussion is presented below.

Report on the Organised Focus Group Discussion

This report summarises the key findings from 12 focus group discussions. These focus group discussions cut across schools of Arts and Social Sciences, Sciences, Languages, Education and Vocational Education from six colleges of education, and departments of Arts and social science, Science and Technology Education, Educational management, Adult Education, Special Education and Library and Information studies Education department from six universities in South-West, Nigeria. At least, one student was chosen from each of the departments mentioned above to make a total of seven (7) respondents for each focus group per each selected school. The discussion revealed that most of the participants believed that teaching with the aid of technology would lead to the achievement of instructional objectives. Most of the participants intended to adopt technology in their future classroom because teaching with technology leads to effective teaching and learning process, leads to better understanding of the content, reduces stress, aids recall, makes teaching and learning effective, provides greater access to learning materials, aids comprehension and improves learner-centred instruction. Technology stimulates students' interest, makes classroom lively, enhances practical and independent learning. Few of the participants believed that technology would not help in the achievement of the instructional objective and did not intend to teach with technology because they believe technology doesn't aid recall the way that copying notes would. Some pre-service teachers also believe that technology can be a distraction in the classroom, technology may malfunction, technology cannot motivate learners, technology cannot teach how the calculation is done, technology is not affordable, and there is lack of or insufficient technological equipment and poor power supply in the instructional settings. The participants named the following technological tools that can be used in the classroom: Projector, television, Computer, laptop, telephone, microphone, social media, Public Address System, Mobile phone, CCTV Camera, Audio Recorder, Video Recorder, Tablets, Speaker, Recorder, Radio, Ipad, Camcoder, Audio/Visual materials, Audio Tape, Visual Display Unit, Video Tape, Use of PowerPoint, scanner, Recording Tapes, Printer, Print Media, Palmtop, MP3, Microsoft word, Megaphone, Interactive White Board, DVD, and Cassette Player. Hindrances to the use of technology to teach in the classroom include distraction that could be cause by technology, financial constraint,

lack of familiarity with technological tools by teachers, lack of infrastructure, poor power supply, fear, misuse of technology by students, small class size, rural location of the school, subject to be taught, stereotypes, poor maintenance of equipment, lecturers' lack of skill or competence to use technology due to their seldom usage of it and government policy.

The Focus Group Discussion

Focus Group Discussions were held between the months of September and October, 2019. The purpose is to affirm the factors earlier mentioned by the pre-service teachers during the preliminary investigation and also to look for other factors that may be germane to teachers' intention to adopt technology in their classrooms. A total number of 12 focus group discussions were conducted. Participants were 7 in each of the groups. Participants from the colleges of education formed six groups while that of the universities were also six groups. A total of 84 participants participated, while each session lasted 35-40 minutes. The participants were both male and female students in each group. Final year students were used in both college and university. Using an open-ended interview procedure to guide discussion, the focus group discussion was facilitated by the researcher with the help of research assistants. A group leader was chosen in each group to aggregate the opinions of the group. Opinions and discussions were also recorded, transcribed and thematically analysed. The participants were tagged as follows:

FGD 1: Focus Group Discussion participants from Federal College of Education Special, Oyo.

FGD 2: Focus Group Discussion Participants from Federal College of Education, Abeokuta.

FGD 3: Focus Group Discussion Participants from Osun State College of Education, Ilesha.

FGD 4: Focus Group Discussion Participants from Adeyemi College of Education, Ondo.

FGD 5: Focus Group Discussion Participants from Ekiti State College of Education, Ikere-Ekiti.

FGD 6: Focus Group Discussion Participants from Federal College of Education, Akoka, Lagos.

FGD 7: Focus Group Discussion Participants from University of Ibadan, Oyo State.

FGD 8: Focus Group Discussion Participants from Tai Solarin University of Education, Ijebu-Ode, Ogun State.
FGD 9: Focus Group Discussion Participants from Obafemi Awolowo University, Ile-Ife, Osun State.
FGD 10: Focus Group Discussion Participants from Adekunle Ajasin University, Akungba-Akoko, Ondo State.
FGD 11: Focus Group Discussion Participants from Ekiti State University, Ado-Ekiti.
FGD 12: Focus Group Discussion Participants from University of Lagos, Akoka, Lagos State.

Question on whether the participants would like to adopt technology to teach in their future classroom. Almost all the participants believed and agreed that they would, and the reasons being that technology could help in achieving instructional objectives in their future classrooms. The participants affirmed the importance of technology in achieving instructional objectives for the following reasons:

Aids Recall

Most of the participants believed that using technology in instructional delivery aids recall. A male participant from FGD group 2 stated that *with technology the learners learn not to forget*; FGD groups 2, group 5, and group 12 believed that since technology involves visual aspect and students' engagement, it aids remembrance. One of the participants in FGD group 12, a female communicates this view by saying "*Anything one sees or practice would always be remembered"*. Participants in FGD group 12 believed that technology aids remembrance because students are not only able to hear but can see what they are taught. Participants in FGD groups 7, group 9 and 12 believed that technology makes learning stay permanent and aids fast remembrance. Participants in FGD groups 1, group 5, and group 6, posit that students retain more knowledge with technology. Some of these participants believe that this is because technology involves the participation of students.

Stress Reduction

A lot of the participants were of the view that technology helped to reduce the stress of teaching. Participants in FGD group 3, group 7, group 6 and group 12 declared that technology reduces teachers' stress. One of the participants in FGD group 7 said

> "Me, I don't think I can be going through all the stress of writing notes or marking and recording plenty examination sheets when there is technology that could help me do that. I would rather plan how to do my things from the onset so it would be easy for me. I don't want to undergo such stress at all! I prefer technology.

Participants in group 8 FGD believe that technology enhances individualised instruction and thereby gives teachers lesser work to do. Participants in FGD group 2, group 4, group 5, group 7, group 8, and group 10 believed that technology makes learning and teaching easier and faster. Some of the participants also posited that technology saves time by making teaching and learning faster, smooth and simple.

Effective Teaching

Technology in instructional delivery will lead to the achievement of instructional objectives because the use of technology in teaching leads to effective teaching. Participants in FGD group 10 stated that technology makes teachers' work efficient. FGD group 7 participants posited that it makes teaching easier and faster. Group 14 FGD believes that technology will make teaching effective. Group 5, group 6 and group 12 FGD also posit that although teaching without technology can be effective, technology makes teaching more effective. One of the participants in FGD group 5 (a male) argued that

> "Apart from the fact that technology simplifies teaching and learning; it also gives room for teachers to express themselves more with technology in the classroom than with textbooks".

Fast Learning

Some of the participants were of the view that technology makes learning fast. This would lead to the ability to complete syllabus not only effectively but also on time. Participants in FGD group 9 believe that technology aids fast learning while

participants in FGD group 12 in agreement posit that students learn faster with technology, especially with video. A female among them said

> "For example, if you begin to play a video with contents to be learnt to those nursery school pupils, you would be surprised at what you would achieve at the end of the lesson"

Participants in FGD group 1, group 4 and group 7 agreed that technology makes learning to be easier and faster.

Learning Simplified/Effective Learning

Some of the participants were of the view that technology makes learning effective. Participants in FGD group 5, group 7 and group 12 believed that technology simplifies learning and makes learning easier and comfortable for students. Participants in FGD group 10, group 11 and group 12 stated that technology makes learning effective. Technology, according to participants in FGD group 3, helps students to learn

Aids Comprehension

Most of the FGD participants attested that technology aids comprehension. Participants in FGD group 1 believed that technology makes learning easier to understand while those of FGD group 2 believed that technology allows for easy assimilation. FGD groups 3, 4, 5, 7 and 12 stated that technology can make students understand better if used to explain some contents and subject matter. Participants in FGD group 2 and group 11 stated that technology helps in quick comprehension of what teachers teach. Participants in FGD group 9 believed that technology aids proper understanding because technology can help show the learning materials, for example, animals, mountains and Lakes or Rivers like real and concrete objects. A female participant among the FGD group 9 *stated*

> "You know, you can search for pictures of real objects like animals and earth quake or rivers from the internet and display to your students in the classroom, it will just look real to them as if the thing is just happening".

The reason technology helps in better assimilation according to FGD group 4 participants, is that it involves practical teaching and most times, video. With this, students get to see and practice what they have been taught.

Access to Learning Materials and Facts/Broadens Students' Knowledge

Technology grants unprecedented access to more learning materials and facts for both students and teachers. Participants in FGD group 4 stated that technology helps both teachers and learners get some fact from the internet. In addition, participants in group 9 believed that technology helps teachers to get more fact and knowledge about the subject matter. According to a female participant in FGD group 3,

> "Both teachers and students can gain more from technology because there is a lot of materials that can be gotten from the internet and shown to learners even though those things could not be brought to class physically examples are cars, lorries, aeroplane".

Participants in FGD group 5 and group 9 stated that teachers get more facts, knowledge and materials on subject matter for teaching while participants in FGD group 11 posited that teachers also learn more from the technology itself.

Technology, according to FGD group 10, also broadens students' knowledge. According to FGD group 7 participants, technology gives students diverse knowledge of the concept being taught. In agreement with these participants, FGD groups 2 and 6 participants posited that with technology, students become vaster in the topic taught and it develops students intellectually. Lastly, participants in FGD group 3 are of the view that students can easily search for knowledge about what they need to know and how to learn faster even than teachers.

Stimulates Student Interest/Lively Classroom

The use of technology will create a lively classroom and help the students to be interested in learning. FGD group 1 participants posited that the use of technology in teaching will make learners more interested in learning and stimulate the interest of learners. According to participants in FGD groups 2, 8 and 11, technology arouses students' interest to learn. Participants in FGD group 10 believed that technology makes learning to be fun as students find pleasure in using technology. FGD groups 1, 7 and 8 participants posited that technology fosters students' interest and makes the classroom and learning to be interesting. According to the FGD group 3 participants, technology boosts morale and interest of learners, and the FGD group 6 participants posited that

technology increases students' motivation. A female member of FGD group 8 express this by saying

> "If you are teaching especially, small pupils with technology, maybe they are watching something like film in the class, just look at them and see their reactions. They would be so serious and unconsciously learn even beyond your imagination"

Comprehension

Most of the FGD participants attested that technology aids comprehension. Participants in FGD group 1 believed that technology makes learning easier to understand while those of FGD group 2 believed that technology allows for easy assimilation. FGD groups 3, 4, 5, 7 and 12 stated that technology can make students understand better if used to explain some contents and subject matter. Participants in FGD group 2 and group 11 stated that technology helps in quick comprehension of what teachers teach. Participants in FGD group 9 believed that technology aids proper understanding because technology can help show the learning materials, for example, animals like real and concrete objects. The reason technology helps in better assimilation according to FGD group 4 participants, is that it involves practical teaching and most times, video, and students get to see and practice what they have been taught.

Learner-Centered Teaching

Participants believed that technology helps to create a learner-centered classroom. Participants in FGD groups 3 and 8 believed that using technology involves the participation of students and makes teaching and learning learners-centered. At the same time, those in FGD groups 2 and 11 are of the view that technology gets students involved in the teaching and learning process. According to participants in FGD groups 3, 7, 10 and 12, the use of technology in instructional delivery will lead to teachers only serving as facilitators or guides. A female from FGD 3 stated

> "With technology you will not have to stress yourself as a teacher, all you need to do is to guide your leaners with little effort.

Enhances Practical and Independent Learning

The use of technology in teaching has been said to make learning practical and enhance independent learning. Participants in FGD groups 6, 7, 8 and 12, thought that technology makes learning real or more concrete because teachers can upload pictures of real objects and display it to students and learners get exposed to real-life examples and experience.

On independent learning, participants in FGD groups 4 and 5 believed that technology helps students to research and learn things ahead of class meetings. In their own view, FGD group 2 and FGD groups 8 and 9 participants believed that technology enables students to learn independently. FGD group 4 participants believed that technology enhances self-learning and assessment, especially with the introvert students. FGD groups 5 and 8 were of the opinion that technologically-driven teaching enables students to read and learn more on their own. Participants of FGD groups 4 and 6 stated that technology encourages individualised learning and notes could be sent to students. At the same time, they download and read them through mobile phones anytime.

Technology is Indispensable

Most of the participants attested to the necessity of teaching with technology. These participants believe that for students to be able to survive in this technological world or era, it is expedient to teach them with technology. Participants in FGD 1 posited that technology rules the world. A female participant among them stated

> "Technology is the language that the world understands now, and we cannot afford to do away with it, therefore, we need, to teach with technology".

while those of FGD group 10 asserted that in the nearest future technology will become more advanced and indispensable. A boy among them said

> "The world has turned into a global village. Technology will continue to be relevant and become more advanced as time goes on, so, me I intend to adopt technology in future when I become a teacher because it is indispensable".

The participants of FGD groups 3, 4, 5, 6, and 7 held the view that technology is the best to use in teaching the 21st-century learners. A female among the participants in FGD group 7 stated:

> "You know we are in the computer age or modern era where everything now revolves around technology and where there is virtually nothing one can do nowadays without technology, the best way to teach the 21st century learners is to use technology".

Participants of FGD group 9 are of the view that technology has taken over the world, and if properly used there will be no distraction for students.

Technological Competence/Familiarity with Technology

Another reason some participants would like to adopt technology in their teaching is the belief that students are already exposed to technology. Participants in FGD groups 1, 4, 5, 7 and 11, stated that students of nowadays are used to or familiar with technology if the technology is used to teach them it will be better.

Intending not to Adopt Technology

Three participants in all: a male from FGD group 2, a female from FGD group 5 and a male from FGD group 8 disagree on technology adoption. Their argument is that technology could not do what teachers would do perfectly, technology is expensive or not affordable by some people and that technology may malfunction during the process of usage.

Question on what the pre-service teachers think could be barrier(s) to the adoption of technology in the classroom, they mentioned some reasons such as:

Erratic Power Supply and Unavailability of Technological Gardget

Most of the participants stated that lack of power supply and unavailability of technological equipment are factors that discourage teaching with technology. Participants in FGD groups 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, and 12 believed that lack of power supply and irregular power supply are conditions that do not allow for teaching with technology. Participants in FGD group 2 stated that if there is no internet facility, teachers will be unable to teach with technology while participants in FGD groups 1, 3,

4, 7, 8, 9, 10, and 12, stated that lack of technological equipment and inadequate supply of technological tools makes teachers unable to teach with technology.

Financial Constraint

A lot of the participants were of the view that financial constraint is a factor that could discourage the use of technology in teaching. Participants in FGD groups 3, 5, 6, 7, 8, 9, 10 and 12 posited that lack of funds discouraged teaching with technology while some were also of the opinion that the government did not provide the financial support needed for technological teaching while teachers and schools lack fund to procure these technological tools. Participants in FGD group 5 were also of the opinion that there is fund scarcity. In addition, FGD group 7 participants stated that lack of money to power generator is one of the factors that hinder technological teaching.

Participants were also of the view that the high cost of equipment, technological tools or facilities discourages the use of technology in teaching. This is a view shared by the participant in FGD groups 1, 7, and 12. Participants in FGD groups 7 and 8 pointed out that the high cost of maintaining technological tools discourages teaching with technology.

Fear

Fear of mistakenly damaging technological tools also discourages teachers from using available technology to teach. Participants of FGD groups 2, 3, 5, 6, 8, 9 11 and 12 stated that if a teacher is afraid of spoiling the technology, the teacher will not use it.

Misuse of Technology

The participants believe that the abuse of technological tools by students is a factor that could discourage teachers from teaching with technology. Technology in such situations serves as more of a distraction than an advantage to the students. Participants in FGD 5 and FGD group 7 believed that teachers will be discouraged from using technology if teachers notice that some students watch pornographic materials or search for things other than educational materials. Participants in FGD groups 1 and 12 posited that too much use of technology could lead to distraction for students and the attention of students might be distracted by images. Those of FGD group 11 are also of the opinion that misuse of technology by students can discourage teachers from using

technology. A female participant in FGD 2 stated *"learners may not know how to use the technological tools, so, that could discourage teachers from using it"*

Teachers' Technological Incompetency

Some of the participants in FGD groups 1, 2, 6, 7, 8, 11 and 12 posited that when teachers' skill to use technology is not updated, and when there are no trained personnels to assist them in time of trouble, teachers will be discouraged from using technology.

Unconducive Environment

Some of the participants in, FGD groups 1, 3, 11 and 12 posited that teachers whose schools are in rural areas where there is lack of infrastructure and electricity are less likely to use technology. A female among FGD group 11 said

> "Even if a teacher wishes to teach with technology, if the so call technology is not available, what would he do? He would have to continue teaching in the old method of course! Also, if the school environment is not conducive, for example, noisy area, teachers are less likely to use technology".

Poor Maintenance Culture

Poor maintenance of equipment is also a factor that participants believe discourages the use of technology for teaching. Participants of FGD group 5 posited that if the equipment or materials to be used are faulty, teachers will be unable to teach with technology. Participants in FGD group 7 are of the opinion that when there is no proper management of equipment, teachers will be unable to teach with technology.

Subject to be Taught

Few of the participants also believe that technology is not needed to teach certain subjects. Few participants in FGD group 12 are of the opinion that subjects like agricultural science and home economics do not need technology for teaching because they are practical subjects. However, some disagreed with them by saying that those subjects could be taught with technology as well.

Small Class Size

Some of the participants in FGD groups 1, 2, 3, 5,6 8 and 12 believed that if the class size is small, teachers will not need to use technology.

Identifying Technological Tools That Could Be Used in Teaching

On the question that asked the participants to mention technological tools known to them, that could be used for teaching, the following technological tools were mentioned by the participants as tools that could be used in teaching-learning process.

Projector, Computer, Laptop, Television, Telephone, Microphone, SocialMedia, Public Address System. Mobile Phone, CCTV Camera, Audio Recorder, Video Recorder, Tablets, Speaker, Recorder, Radio, Ipad, Camcorder, Audio/Visual Materials

Audio Tape, Video Tape, Use of PowerPoint, Scanner, Recording Tapes, Microsoft, Word, Megaphone, Interactive White Board, DVD, Cell Phones, Cassette player and Android Phones.

On whether pre-service teachers have heard about technology acceptance model before, many of them said they have not heard about it. Only seven participants in all, affirmed that they have heard about technology acceptance model. They are one participant each from FGD group 2, 7, 8, 10, and 11 while two participants were from FGD group 12.

In conclusion, the factors mentioned by the pre-service teachers to predict intentiom to use technology in Nigeria for both preliminary investigation and the Focus Group Discussion are essentially the same.

CHAPTER FOUR
RESULTS AND DISCUSSION

The findings obtained were analysed and discussed to provide answers to the research questions raised.

4.1 Answers to the Research Questions

4.1.1 Research Question one: How consistent is the hypothesised extended UTAUT model consisting of Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Condition (FC), Technology Familiarity (TF), Technological Anxiety (TA), Attitude towards Technology (ATT), Accessibility to Technological Resources (ACC), Moderating Effect of Gender, Age, Year of Technology Usage, School Location Preference, Classroom Size Preference, Voluntariness to Use Technology and Intention to Use Technology for Teaching (BI), with the empirical data?

To answer this research question, the responses of the sampled student-teachers to Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Condition, Technology Familiarity, Technological Anxiety, Attitude toward Technology, Accessibility to Technological Resources, moderating effect of gender, age, year of technology usage, school location preference, classroom size preference, voluntariness to use technology and intention to use technology for teaching, in the copies of the questionnaires, were subjected to partial least square structural equation modelling (PLS-SEM). To assess the fitness of the model, the two major indices were used. They are adequacy of the measurement model and adequacy of the structural model.

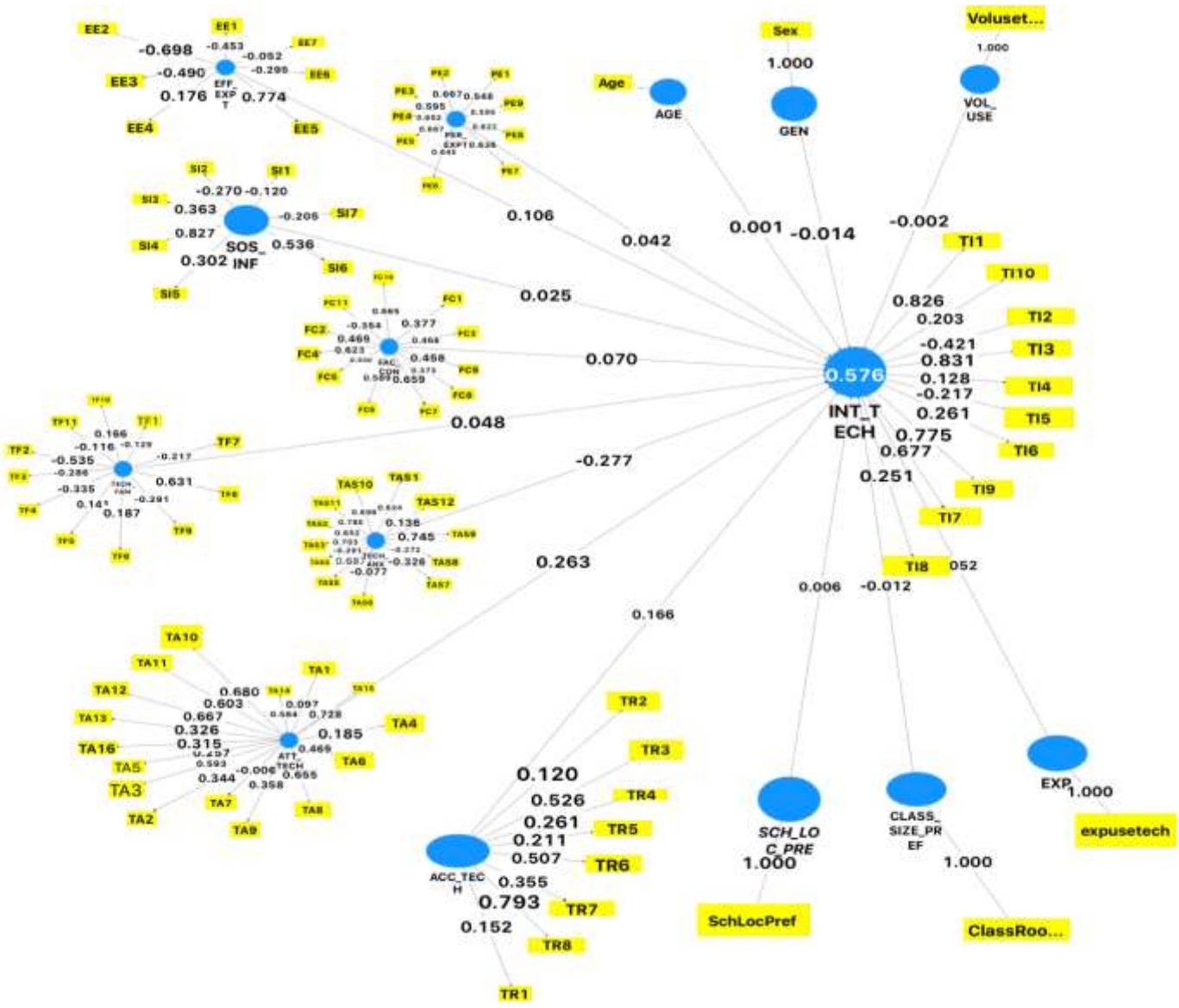

Figure 4.1: The Estimated PLS-SEM of the Extended UTAUT Model (adapted from Venkatesh Morris Davis and Davis 2003).

Figure 4.1 shows the estimated model of the extended UTAUT model. The fitness of the model to the empirical data is assessed along the measurement and structural model assessment. The results are presented in Table 4.1

Measurement Model Assessment

Table 4.1: Convergent Validity of the Latent Variable in the Extended UTAUT Model

Variable	Item	Loading	CR	AVE
Age				
ClassSizePref				
SchLocPref				
Gender				
Volusetech				
Expusetech				
EFF EXPT	EE1	-0.45	0.17	0.24
	EE2	-0.70		
	EE3	-0.49		
	EE4	0.18		
	EE5	0.77		
	EE6	-0.30		
	EE7	-0.05		
FAC CON	FC1	0.38	0.75	0.27
	FC10	0.67		
	FC11	-0.35		
	FC2	0.47		
	FC3	0.47		
	FC4	0.62		
	FC5	0.55		
	FC6	0.59		
	FC7	0.66		
	FC8	0.37		
	FC9	0.46		
PER EXPT	PE1	0.55	0.85	0.39
	PE2	0.67		
	PE3	0.60		
	PE4	0.60		
	PE5	0.67		
	PE6	0.65		
	PE7	0.64		
	PE8	0.62		
	PE9	0.60		
SOS INF	SI1	-0.12	0.27	0.19
	SI2	-0.27		
	SI3	0.36		
	SI4	0.83		
	SI5	0.30		
	SI6	0.54		

	SI7	-0.20		
ATT TECH	TA1	0.10	0.79	0.23
	TA10	0.68		
	TA11	0.60		
	TA12	0.67		
	TA13	0.33		
	TA14	0.58		
	TA15	0.73		
	TA16	0.31		
	TA2	0.34		
	TA3	0.59		
	TA4	0.18		
	TA5	0.26		
	TA6	0.47		
	TA7	-0.01		
	TA8	0.66		
	TA9	0.36		
TECH ANX	TAS1	0.62	0.67	0.31
	TAS10	0.70		
	TAS11	0.78		
	TAS12	0.14		
	TAS2	0.65		
	TAS3	0.70		
	TAS4	-0.29		
	TAS5	0.69		
	TAS6	-0.08		
	TAS7	-0.33		
	TAS8	-0.27		
	TAS9	0.74		
TECH FAM	TF1	-0.13	0.06	0.10
	TF10	0.17		
	TF11	-0.12		
	TF2	-0.53		
	TF3	-0.29		
	TF4	-0.33		
	TF5	0.14		
	TF6	0.19		
	TF7	-0.22		
	TF8	0.63		
	TF9	-0.29		
ACC TECH	TR1	0.15	0.57	0.18

	TR2	0.12		
	TR3	0.53		
	TR4	0.26		
	TR5	0.21		
	TR6	0.51		
	TR7	0.35		
	TR8	0.79		
BEH INT	TI1	0.83	0.61	0.28
	TI10	0.20		
	TI2	-0.42		
	TI3	0.83		
	TI4	0.13		
	TI5	-0.22		
	TI6	0.26		
	TI7	0.68		
	TI8	0.25		
	TI9	0.77		

Table 4.1 shows the convergent validity of the constructs in the hypothesised model. The table shows that for the construct (performance expectancy), all the items were reliable (the loadings were all greater than 0.5), the construct was reliable (composite reliability was greater than 0.6) and the estimated AVE was 0.39. For effort expectancy, only two of the seven items (items 2 and 5) were reliable (loadings were greater than 0.5); five items (items 1, 3, 4, 6 and 7) were not reliable (loadings were less than 0.5). For social influence, two (items 4 and 6) of the items that measured the construct were reliable (loadings were greater than 0.5), while five (items 1, 2, 3, 5 and 7) of the items of the scale were not reliable (loadings were less than 0.5). The construct was not reliable (composite reliability; 0.27 was less than 0.6), and the AVE was less than 0.4 (AVE = 0.19). For facilitating condition, five (items 4, 5, 6, 7 and 10) of the 11 items measuring the construct were reliable (loadings were greater than 0.5), while the remaining five items were not. The construct was reliable (composite reliability = 0.75); the AVE was less than 0.4 (AVE = 0.27).

For technology familiarity, two (items 2 and 8) out of the 11 items were reliable (loadings were greater than 0.5) and the remaining nine items were not reliable. The construct was not reliable (composite reliability = 0.06); the AVE of the construct (0.10) was not up to the minimum standard (AVE = 0.4). For technological anxiety, seven (items 1, 2, 3, 5, 9, 10 and 11) out of the 12 items that measured pre-service teachers' technological anxiety were reliable (factor loadings were greater than 0.5); the remaining five items (items 4, 6, 7, 8 and 12) were not reliable. The construct was

reliable (composite reliability estimate, 0.67, was greater than 0.6) and the AVE of the construct was less than the minimum standard 0.4 (AVE = 0.31). For attitude towards technology, out of the 16 items that made the scale measuring pre-service teachers' attitude towards technology, seven (items 3, 8, 10, 11, 12, 14 and 15) were reliable, while the remaining nine items (item 1, 2, 4, 5, 6, 7, 9, 13 and 16) were not. The construct was reliable (estimated composite reliability, 0.79, was greater than the minimum standard, 0.6).

For accessibility to technological resources (ACC), out of the 8 items that made up the scale that was used in measuring pre-service teachers' accessibility to technological resources, three (items 3, 6 and 8) were reliable (loadings were respectively greater than 0.5), and the remaining items of the scale were not reliable. While the scale was not reliable (estimated reliability was 0.57), the estimated AVE was not adequate (AVE = 0.18). For the intention to use technology, out of the 10 items that made up the scale used in the measurement of pre-service teachers' intention to use technology in teaching, four were reliable (items 1, 3, 7, and 9); the remaining 6 items of the scale were not. The scores obtained from the scale was reliable (estimated reliability was 0.61), but the AVE of the scores obtained from the scale was not substantial (AVE = 0.28).

Discriminant Validity

The assessment of the discriminant validity of the constructs in the hypothesised UTAUT model is presented in Table 4.2

Table 4.2: Heterotrait-Monotrait Ratio of the Constructs in the Hypothesised UTAUT Model

	ACC_TECH	AGE	ATT_TECH	CLASS_SIZE_PREF	EFF_EXPT	EXP	FAC_CON	GEN	INT_TECH	PER_EXPT	SCH_LOC_PRE	SOS_INF	TECH_ANX	TECH_FAM	VOL_USE
ACC_TECH															
AGE	0.08														
ATT_TECH	0.81	0.05													
CLASS_SIZE_PREF	0.08	0.04	0.07												
EFF_EXPT	0.57	0.03	0.66	0.10											
EXP	0.14	0.04	0.16	0.04	0.14										
FAC_CON	0.62	0.06	0.60	0.06	0.53	0.12									
GEN	0.10	0.04	0.13	0.12	0.15	0.19	0.06								
INT_TECH	0.75	0.05	0.81	0.07	0.57	0.18	0.50	0.12							
PER_EXPT	0.48	0.07	0.49	0.06	0.43	0.12	0.72	0.06	0.41						
SCH_LOC_PRE	0.06	0.14	0.06	0.12	0.09	0.04	0.04	0.03	0.03	0.02					
SOS_INF	0.68	0.09	0.67	0.06	0.85	0.15	0.67	0.18	0.56	0.53	0.07				
TECH_ANX	0.66	0.05	0.86	0.07	0.59	0.16	0.46	0.10	0.78	0.37	0.03	0.59			
TECH_FAM	0.47	0.06	0.46	0.04	0.42	0.11	0.42	0.12	0.33	0.36	0.06	0.49	0.34		
VOL_USE	0.06	0.01	0.05	0.01	0.10	0.07	0.07	0.14	0.04	0.04	0.06	0.10	0.05	0.07	

Table 4.2 shows the discriminant validity of the variables in the model. The table shows that all the variables in the model recorded HTMT that was lower than the 0.90 benchmark. The result further revealed that the variables in the model possess discriminant validity. The implication is that the variables in the model are substantially different from one another. Overall, the constructs in the model possess discriminant validity but lack convergent validity. The result showed that the items that made up the variables in the model cannot provide accurate measurement for the prediction of pre-service teachers' intention to use technology for teaching. This implies that the hypothesised extended UTAUT model consisting of (PE), (EE), (SI), (FC), (TF), (TA), (ATT), (ACC) and moderating variables: Gender, Age, Experience, School Location Preference, Classroom Size Preference, Voluntariness to use Technology and Intention to Use Technology for Teaching (BI), was not consistent with the empirical data. The result implies that the hypothesised extended UTAUT model consisting of (PE), (EE), (SI), (FC), (TF), (TA), (ATT), (ACC) and moderating effects of Sex, Age, Experience, School Location Preference, Classroom Size Preference and Voluntariness to Use Technology and (BI), does not provide an adequate explanation for pre-service teachers' intention to use technology for teaching-learning activities.

4.1.2 **Research Question Two:** What is the most meaningful model describing the extended UTAUT model?

To answer this research question, two levels of analysis were conducted. One, the unreliable items under the measurement model assessment were removed, and the

model was re-estimated. After that, the measurement and structural model assessment were sequentially ensured to isolate the most meaningful extended UTAUT model. The result is presented in Table 4.3

Table 4.3: Convergent Validity of the Latent Variable in the Extended UTAUT Model after Trimming

Variables	Item	Item loading	CR	AVE
Volusetech		1		
Expusetech		1		
Age		1		
ClassRoomPref		1		
SchLocPref		1		
Gender		1		
EFF_EXPT	EE2	0.71	0.8	0.6
	EE5	0.87		
FAC_CON	FC10	0.74	0.8	0.5
	FC4	0.62		
	FC6	0.65		
	FC7	0.69		
PER_EXPT	PE2	0.73	0.8	0.5
	PE3	0.61		
	PE5	0.71		
	PE6	0.67		
	PE7	0.65		
SOS_INF	SI4	0.91	0.8	0.6
	SI6	0.65		
ATT_TECH	TA10	0.73	0.9	0.5
	TA11	0.66		
	TA12	0.72		
	TA14	0.64		
	TA15	0.77		
	TA3	0.63		
	TA8	0.69		

TECH_ANX	TAS1	0.65	0.9	0.5
	TAS10	0.72		
	TAS11	0.78		
	TAS2	0.67		
	TAS3	0.72		
	TAS5	0.71		
	TAS9	0.76		
TECH_FAM	TF2	0.64	0.7	0.5
	TF8	0.77		
ACC_TECH	TR3	0.65	0.8	0.5
	TR6	0.63		
	TR8	0.87		
INT_TECH	TI1	0.82	0.9	0.7
	TI3	0.85		
	TI7	0.74		
	TI9	0.81		

Table 4.3 shows the reliability of the items used in the measurement of the variables in the extended UTAUT model and their reliability and average variances extracted out of the nine variables after the removal of unreliable items. The table shows that all the remaining items on each of the scales measuring the latent variables were reliable. Furthermore, the table shows that all the scales measuring each latent variable were reliable, and the estimated AVEs were substantial. The result showed that the convergent validity of the latent variables in the model was very high after removing unreliable items from the hypothesised extended UTAUT model.

Table 4.4: Hetero-trait Mono-trait Estimate of the Latent Variables in the UTAUT Model

	ACC_TECH	AGE	ATT_TECH	CLASS_SIZE_PREF	EFF_EXPT	EXP	FAC_CON	GEN	INT_TECH	PER_EXPT	SCH_LOC_PRE	SOS_INF	TECH_ANX	TECH_FAM	VOL_USE
ACC_TECH															
AGE	0.04														
ATT_TECH	0.86	0.03													
CLASS_SIZE_PREF	0.06	0.04	0.05												
EFF_EXPT	0.63	0.03	0.69	0.11											
EXP	0.06	0.18	0.07	0.00	0.09										
FAC_CON	0.18	0.08	0.27	0.09	0.27	0.11									
GEN	0.02	0.05	0.08	0.12	0.08	0.08	0.08								
INT_TECH	0.70	0.03	0.76	0.07	0.69	0.10	0.40	0.11							
PER_EXPT	0.12	0.08	0.19	0.08	0.16	0.13	0.71	0.05	0.29						
SCH_LOC_PRE	0.05	0.15	0.04	0.12	0.04	0.02	0.03	0.07	0.02	0.02					
SOS_INF	0.64	0.09	0.62	0.10	0.86	0.03	0.18	0.10	0.55	0.13	0.06				
TECH_ANX	0.71	0.02	0.78	0.07	0.73	0.08	0.31	0.07	0.76	0.23	0.02	0.65			
	0.48	0.33	0.42	0.35	0.68	0.65	0.34	0.12	0.78	0.54	0.52	0.28	0.41		
VOL_USE	0.03	0.01	0.03	0.01	0.07	0.02	0.06	0.18	0.03	0.03	0.06	0.04	0.03	0.53	

Table 4.4 shows the discriminant validity of the trimmed latent variables in the extended UTAUT model. The table shows that the HTMT ratio of the trimmed latent variables returned values less than the 0.9 criterion when paired with one another. The result showed that trimmed latent variables in the extended UTAUT model were of high discriminant validity. The implication is that the latent variables were significantly different from one another. In all, the results showed that removing unreliable items from the latent variables in the extended UTAUT model resulted in a sound measurement model. Therefore, the structural model was assessed. The result is presented in Table 4.5

Table 4.5: Structural Model Assessment of the Trimmed Extended UTAUT Model

Path	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Q2
ACC_TECH -> INT_TECH	0.14	0.02	6.61	0.000	
AGE -> INT_TECH	0.01	0.01	0.44	0.660	
ATT_TECH -> INT_TECH	0.25	0.02	10.23	0.000	
CLASS_SIZE_PREF -> INT_TECH	-0.01	0.01	0.97	0.330	
EFF_EXPT -> INT_TECH	0.09	0.02	4.82	0.000	
EXP -> INT_TECH	0.03	0.02	1.73	0.080	
FAC_CON -> INT_TECH	0.09	0.02	4.92	0.000	
GEN -> INT_TECH	-0.04	0.02	2.12	0.030	
PER_EXPT -> INT_TECH	0.06	0.02	3.42	0.000	
SCH_LOC_PRE -> INT_TECH	0.01	0.01	0.58	0.560	
SOS_INF -> INT_TECH	0.03	0.02	1.66	0.100	
TECH_ANX -> INT_TECH	-0.29	0.02	11.93	0.000	
TECH_FAM -> INT_TECH	0.05	0.03	1.66	0.100	
VOL_USE -> INT_TECH	-0.01	0.01	0.98	0.330	
INT TECH					0.34

Table 4.5 shows the structural model assessment of the trimmed model. The table shows that the only endogenous variable in the trimmed extended UTAUT model, the Intention to use Technology (BI), was relevant to the predictive model (estimated $Q^2 = 0.34$).

The table shows that social influence and technology familiarity have no significant causal link with behavioural intention. Hence, social influence and technology familiarity were not modelled. How long pre-service teachers have been using technology (EXP) has no direct causal effect; thus, the moderation effect was not tested. Voluntariness to use technology to teach (VU) has no significant direct causal effect; thus, the moderation effect was not tested; pre-service teachers' classroom size preference has no significant direct causal effect; thus, the moderation effect was not tested; age has no significant direct causal effect; thus, the moderation effect was not tested; and the school location preference of pre-service teachers has no significant direct causal effect; thus, the moderation effect was not tested. Therefore, moderating effects of gender, the only moderating variable with significant causal effect on Behavioural Intention (BI), was estimated. The result is presented in Table 4.6

Table 4.6: Path Coefficient of Extended UTAUT Model

	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
ACC_TECH -> INT_TECH	0.12	0.03	4.11	0.000
ACC_TECH*GEN -> INT_TECH	0.04	0.03	1.10	0.272
ATT_TECH -> INT_TECH	0.20	0.04	4.52	0.000
ATT_TECH*GEN -> INT_TECH	0.10	0.05	1.80	0.072
EFF_EXPT -> INT_TECH	0.10	0.03	3.86	0.000
EFF_EXPT*GEN -> INT_TECH	0.01	0.03	0.23	0.821
FAC_CON -> INT_TECH	0.11	0.03	3.86	0.000
FAC_CON*GEN -> INT_TECH	-0.01	0.05	0.12	0.902
GEN -> INT_TECH	-0.41	0.24	1.75	0.081
PER_EXPT -> INT_TECH	0.08	0.03	2.61	0.009
PER_EXPT*GEN -> INT_TECH	-0.02	0.06	0.32	0.750
TECH_ANX -> INT_TECH	-0.37	0.04	9.84	0.000
TECH_ANX*GEN -> INT_TECH	0.05	0.03	1.66	0.100

Table 4.6 shows that accessibility to technological resources (beta = 0.12, p-value = 0.000), attitude towards technology (beta = 0.20, p-value =0.000), effort expectancy (beta =0.10, p-value = 0.000), facilitating condition (beta = 0.11, p-value = 0.000), performance expectancy (beta =0.08, p-value =0.009) and technological anxiety (beta = -0.37, p-value = 0.000) significantly predicted pre-service teachers' intention to use technology for teaching. Furthermore, the table shows that gender did not significantly moderate the effect of pre-service teachers' accessibility to technology on their intention to use technology for teaching ($\beta = 0.04$, $p = 0.272$). Gender did not significantly moderate the effect of pre-service teachers' attitude towards technology on their intention to use technology for teaching ($\beta = 0.10$, $p = 0.072$).

Gender did not significantly moderate the effect of effort expectancy on pre-service teachers' intention to use technology for teaching ($\beta = 0.01$, $p = 0.821$). Gender did not significantly moderate the effect of facilitating condition on pre-service teachers' intention to teach with technology ($\beta = -0.01$, $p = 0.902$). Gender did not significantly moderate the effect of performance expectancy on pre-service teachers' intention to teach with technology ($\beta = -0.02$, $p = 0.750$). Gender did not significantly moderate the pre-service teachers' technological anxiety on their intention to teach with technology ($\beta = 0.05$, $p = 0.100$). Consequently, all the insignificant paths in the model presented in Figure 4.1 were deleted from the model to obtain the most meaningful model for explaining pre-service teachers' intention to use technology for teaching. Figure 4.2 presents the meaningful causal model.

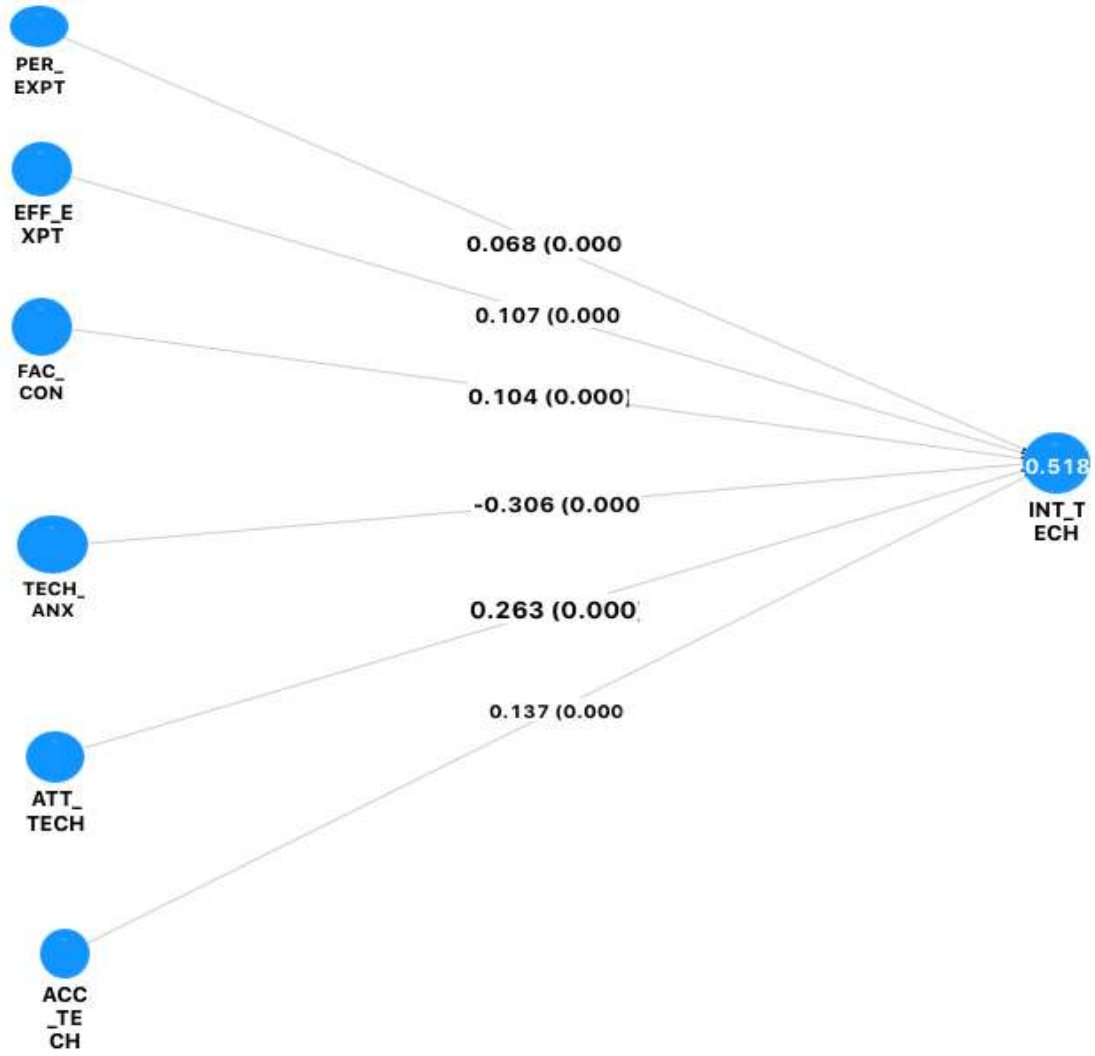

Figure 4.2. The Extended UTAUT Model for the Study.

Source: Researcher

Keys:

PER_EXP: Performance Expectancy

EFF_EXPT: Effort Expectancy

FAC_CON: Facilitating Condition

TECH_ANX: Technological Anxiety

ATT_TECH: Attitude Towards Technology Use

ACC_TECH: Accessibility to Technological Resources

INT_TECH: Intention to Use Technology

The result implies that south-western pre-service teachers' intention to use technology for teaching can sufficiently be predicted from the combination of Performance Expectancy, Effort Expectancy, Facilitating Condition, Technological Anxiety, Attitude Towards Technology, and Accessibility to Technological Resources.

4.1.3 **Research Question Three:** How much variance did the exogenous variables account for in the criterion variable in the extended UTAUT model variables?

To answer this research question, the adjusted R squared of the validated extended UTAUT model is presented in Figure 4.3. The result is presented in Table 4.7

Table 4.7: Adjusted R Squared Coefficient of the Validated UTAUT Model

	R Square	R Square Adjusted
INT_TECH	0.52	0.52

Table 4.7 shows the amount of variance the combination of performance expectancy, effort expectancy, facilitating condition, technological anxiety, attitude towards technology, accessibility to technological resources accounted for regarding the pre-service teachers' intention to use technology for teaching.

The table shows that the adjusted R squared estimated for the validated UTAUT model was 0.52. The result indicated that performance expectancy, effort expectancy, facilitating condition, technological anxiety, attitude towards technology, and accessibility to technological resources, jointly accounted for 52.0% of the variance observed in pre-service teachers' intention to use technology. The result implies that the validated extended UTAUT model can predict the intention of one out of every two pre-service teachers' intention to teach with technology.

4.1.4 **Research Question Four:** What is the relative influence of the exogenous variables in the prediction of pre-service teachers' intention to use technology for teaching based on the validated UTAUT model?

To answer the research question, the size of the effect of the exogenous variables on pre-service teachers' intention to use technology was calculated. The feat is achieved by calculating the change in amount of variance contributed by a particular exogenous variable in the total variance observed in the model. Mathematically, it is given as: $f^2 = \frac{R^2\ included\ exogenous\ variable - R^R\ excluded\ exogenous\ variable}{1 - R^R\ included\ exogenous\ variable}$

According to Cohen (1988, p. 410-414), values of 0.02, 0.15 and 0.35 represent small, medium and large effect sizes respectively. The resulting size of effects of the exogenous variables in the predictive model are presented in Table 4.8

Table 4.8: Relative Effectiveness of Exogenous Variables in the Prediction of Pre-Service Teachers' Intention to Use Technology

	INT_TECH
ACC_TECH	0.02
ATT_TECH	0.07
EFF_EXPT	0.02
FAC_CON	0.02
PER_EXPT	0.01
TECH_ANX	0.10

Table 4.8 shows the amount of variance each of the exogenous variables (performance expectancy, effort expectancy, facilitating condition, technological anxiety, attitude towards technology, accessibility to technological resources and pre-service teachers' intention to use technology for teaching) possesses.

The table shows the size of effect of the exogenous variables in the validated UTAUT model for performance expectancy, effort expectancy, social influence, facilitating condition, technological anxiety, attitude towards technology use, accessibility to technological resources, and pre-service teachers' intention to use technology. The table shows that accessibility to technological resources, effort expectancy, facilitating condition, and performance expectancy had low effect (less than or equal to 0.02). Furthermore, the table shows that attitude towards technology and technological anxiety had moderate effect (greater than 0.02 and less than 0.15) on pre-service teachers' intention to use technology for teaching. The results showed that technological anxiety had the largest effect on pre-service teachers' intention to use technology followed by attitude towards technology. Then, accessibility to technology, effort expectancy, facilitating condition, and performance expectancy had the less effect on pre-service teachers' intention to use technology.

Research question 5: To what extent do age, gender, voluntariness to use technology, classroom size preference, school location preference and experience in the use of technology moderate the effect of the individual exogenous variables on pre-service teachers' intention to use technology for teaching?

To answer this research question, two levels of the analysis were carried out: the effects of the moderating variables were first assessed, and the result presented in Table 4.5 showed that age, voluntariness to use technology, classroom size preference, school location preference and experience do not have significant effect on the prediction of the criterion (pre-service teachers' intention to use technology for teaching). The implication is that the moderating variables cannot moderate the effect of the exogenous variables (Performance Expectancy, Effort Expectancy, Facilitating Condition, Technological Anxiety, Attitude Towards Technology, Accessibility to Technological Resources) on pre-service teachers' intention to teach with technology. The second analysis was the analysis of the moderation effect of the exogenous variable on gender which has a significant effect on the criterion. The result presented in Table 4.6 shows that: Gender did not significantly moderate the effect of pre-service teachers'

accessibility to technology on their intention to use technology for teaching ($\beta = 0.04$, $p = 0.272$). Gender did not significantly moderate the effect of pre-service teachers' attitude towards technology on their intention to use technology for teaching ($\beta = 0.10$, $p = 0.072$). Gender did not significantly moderate the effect of effort expectancy on pre-service teachers' intention to use technology for teaching ($\beta = 0.01$, $p = 0.821$). Gender did not significantly moderate the effect of facilitating condition on pre-service teachers' intention to teach with technology ($\beta = -0.01$, $p = 0.902$). Gender did not significantly moderate the effect of performance expectancy on pre-service teachers' intention to teach with technology ($\beta = -0.02$, $p = 0.750$). Gender did not significantly moderate the pre-service teachers' technological anxiety on their intention to teach with technology ($\beta = 0.05$, $p = 0.100$).

The results showed that gender did not moderate the effect of the exogenous variables on the criterion in the extended UTAUT model. The implication of the result is that: The extent to which accessibility to technology predicts pre-service teachers' intention to use technology is independent of the teachers' genders; the extent to which attitude towards technology predicts pre-service teachers' intention to use technology is independent of the teachers' genders; and the extent to which effort expectancy predicts pre-service teachers' intention to use technology is independent of the teachers' genders. Moreover, the extent to which facilitating condition predicts pre-service teachers' intention to use technology is independent of the teachers' genders; the extent to which performance expectancy predicts pre-service teachers' intention to use technology is independent of the teachers' genders; and the extent to which technological anxiety predicts pre-service teachers' intention to use technology is independent of the teachers' genders.

Research question 6: What is the variant of the validated extended UTAUT model with respect to universities and colleges of education like?

To answer this research question, the validated extended UTAUT model was subjected to multiple group analysis. The result is presented as follows.

Table 4.9: Path Coefficients of Validated Extended UTAUT Model in College of Education and University Samples

PATH	BETA (COE)	BETA(UNI)	Path Coefficients-diff (COE - UNI)	P-Value new (COE vs UNI)
ACC_TECH -> INT_TECH	0.14	0.13	0.01	0.774
ATT_TECH -> INT_TECH	0.20	0.22	-0.02	0.530
EFF_EXPT -> INT_TECH	0.12	0.09	0.04	0.316
FAC_CON -> INT_TECH	0.12	0.09	0.02	0.530
PER_EXPT -> INT_TECH	0.04	0.10	-0.06	0.085
TECH_ANX -> INT_TECH	-0.34	-0.27	-0.07	0.144

Table 4.9 shows the extent to which exogenous variables predicted pre-service teachers' intention to use technology in teaching among college of education and university pre-service teachers. The table shows there was no significant difference in the extent to which each of the exogenous variables in the validated extended UTAUT model predicted the criterion (college of education and university pre-service teachers' intention to use technology for teaching). For example, the table shows that there was no significant difference in the extent to which accessibility predicted the intention to use technology among college of education and university pre-service teachers ($\beta_{COE} = 0.14, \beta_{UNI} = 0.13;\ \beta_{diff} = 0.01, p = 0.774$). The result showed that the predictive model behaved in a similar manner in providing explanation for pre-service teachers' intention to use technology for teaching. The implication of the result is that the extended UTAUT model provided explanation for pre-service teachers' intention to use technology, irrespective of the type of institution where the teachers are being trained.

In conclusion, Figure 4.3 and Figure 4.4 present the original UTAUT model and the Extended UTAUT model for the study respectively.

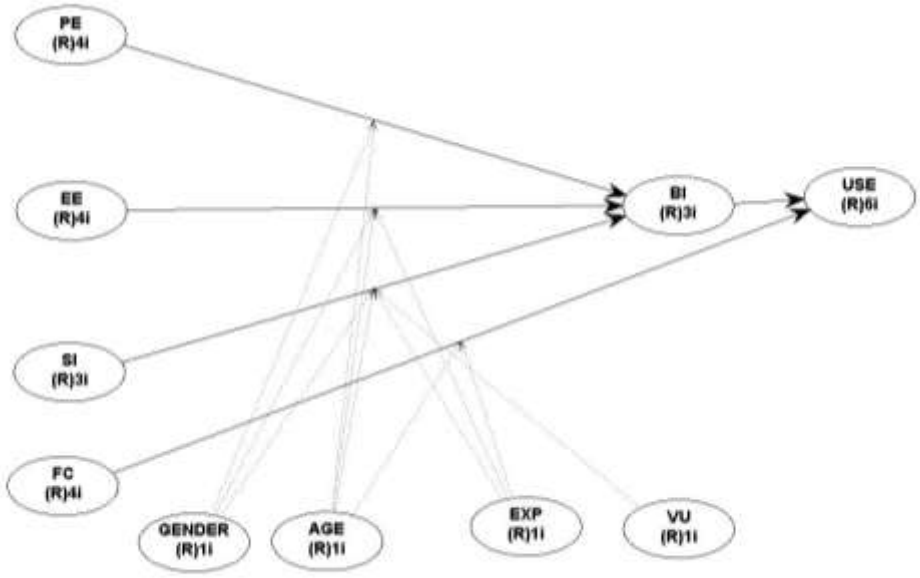

Figure 4.3: The Original UTAUT Model (Venkatesh, Morris, Davies, and Davies, 2003).

Keys:

PE: Performance Expectancy

EE: Effort Expectancy

SI: Social Influence

FC: Facilitating Condition

EXP: Experience

VU: Voluntariness of Use

BI: Behavioural Intention

USE: Use Behaviour

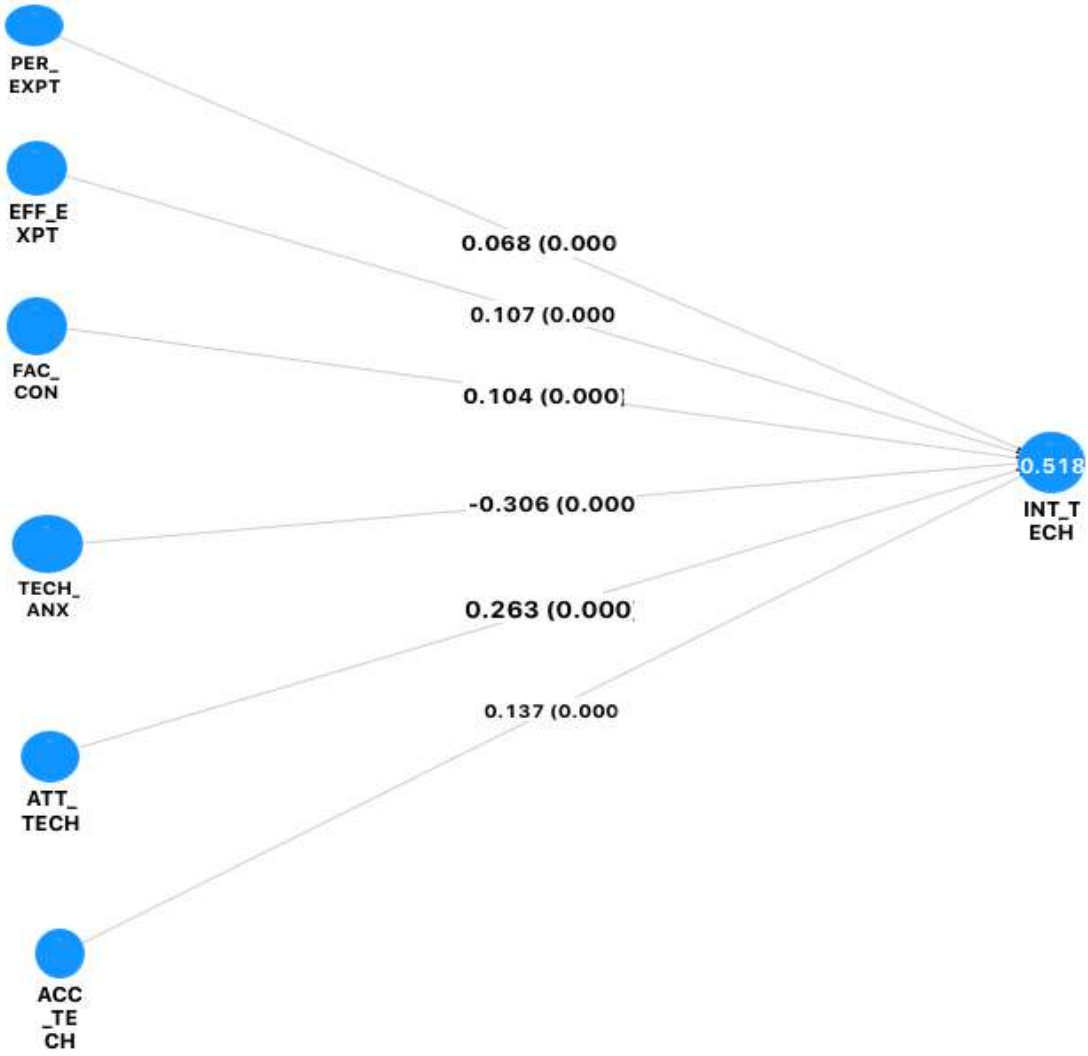

Figure 4.4. The Extended UTAUT Model for the Study.

Source: Researcher

Keys:

PER_EXP: Performance Expectancy

EFF_EXPT: Effort Expectancy

FAC_CON: Facilitating Condition

TECH_ANX: Technological Anxiety

ATT_TECH: Attitude Towards Technology Use

ACC_TECH: Accessibility to Technological Resources

INT_TECH: Intention to Use Technology

4.2 Discussion of Findings

Performance expectancy (PE) has a significant direct causal effect on pre-service teachers' intention to use technology for teaching (BI) The implication is that the more pre-service teachers perceived that technology would assist them in the performance of their jobs, the more likely their intention to use technology during teaching. This finding is in agreement with the UTAUT theory, which postulates that performance expectancy influences behavioural intention. In the same vein, it is in agreement with the Technology Acceptance Model which states that perceive usefulness of a technology determines user's intention to adopt the technology in question. This corroborates the findings of Hamzat and Mabawonku (2018) who studied the performance expectancy of engineering lecturers in the use of digital library in universities in southwest Nigeria. They found out that a significant number of engineering lecturers made use of digital library resources because it exposed them to global collaborative research. In other words, performance expectancy was a critical factor in using digital library resources by engineering lecturers in Nigerian universities. This is also in line with the findings of Tabassum, Roknuzzaman and Islam (2015) who found that staff and students' knowledge of search domain, quality of digital library content, system characteristics, and performance expectancy influence their intention to use the web-based library system.

In the same vein, Zhenghao, Alcorn, Christensen, Eriksson, Koller, and Emanuel (2015), found that performance expectancy directly influences behavioural intention to use web-based technology. In this wise, pre-service teachers' intention to use technology could be positively influenced by the expected benefits such digital tools could offer in effective instructional delivery. This might not be unconnected with the fact that technology has pervaded every aspect of lives. The pre-service teachers are aware of the use of some technological tools and platforms to enhance the teaching-learning process. Technology has come into education as a positive response to engender effective instructional delivery, especially at the higher education level. Therefore, pre-service teachers could have recognised the effectiveness of technological tools and platforms in the discharge of their instructional responsibilities.

Findings also showed a significant direct effect of effort expectancy on pre-service teachers' intention to use technology for classroom instruction. The result implies that the more pre-service teachers perceived that technology requires less effort in the performance of their teaching jobs, the more likely their intention to use

technology during teaching. This finding is in agreement with the UTAUT theory, which states that the more a technology use is free of effort, the more a consumer intends to use it. The result is also at pal with the Technology Acceptance Model, which postulates that perceive ease of use of a technology determines user's intention to use the technology. It should be noted that the more users perceive a certain technology to be devoid of technical complexities, the more likely they will be ready to use such a technology to execute tasks. This is also emphasised in the Technology Acceptance Model that perceived ease of use could be a significant factor influencing the intention to use technology. Pre-service teachers would intend to use any technological device or platform that could be operated with minimum effort in the classroom.

The result agrees with the research findings of Tan (2013), who affirmed that effort expectancy had a positive effect on behavioural intention to use e-learning resources to learn. The implication is that the ease at which students can navigate through an e-learning website goes a long way in determining their level of online participation on the platform. Thus, effort expectancy directly links users' intention to use e-learning platforms for instructional activities. A study conducted by Wang, Wu, and Wang (2009) on mobile learning usage showed that performance expectancy, effort expectancy, social influence, perceived playfulness, and self-management of learning were all significant determinants of behavioural intention to use mobile learning resources in an instructional setting. Thus, teachers' intention to use ICT tools and other online learning platforms could be influenced by the effort expectancy associated with such technologies. Dull (2019) also found out that effort expectancy influences behavioural intention to use e-books. In the area of open access educational content, Dulle (2015) conducted a study in Tanzanian universities using UTAUT. The study revealed that effort expectancy is a key determinant of researchers' behavioural intention to use open-access educational content. So, this finding could be because teachers will be willing to utilise technological tools and platforms that require fewer efforts to operate in the instructional setting.

The research revealed that social influence (SI) has no significant direct causal effect on pre-service teachers' intention to use technology for teaching (BI). It implies that the pre-service teachers were not influenced socially by their families, friends, and school authorities. This finding is in contrast with the UTAUT theory, which postulates that social influence predicts intention. These components of social influence might not be the predetermining factors influencing the intention of pre-service teachers to teach

with technology. In other words, other components beyond these identified "important others" might be responsible for their intention to use technology in the classroom. The findings herein concur with the works of Magsamen-Conrad, Upadhyaya, Joa, and Dowd (2015) which posited that social influence does not significantly affect tablet use intentions. In the same vein, Eli, Craig, George, and Kwame (2018) also reported that students feel they do not need the support of their social circle or friends to be motivated to use the MOOC. This is at variance with the findings of De˘cman (2015), who conducted a study to determine the impact of UTAUT variables on the intention to use an e-learning system in a mandatory setting.

This might not be unconnected with the fact that students now live in a media-saturated environment, and the only language they understand is technology. So, regardless of the support of friends and family, pre-service teachers will still consider technology as an integral component of teaching and learning. Thus, they will still go the extra mile to utilise technology for instructional delivery.

The research revealed that facilitating condition (FC) has a significant direct causal effect on pre-service teachers' intention to use technology for teaching (BI). The result implies that if pre-service teachers perceive they would enjoy support from the school and there would be availability of technically-related equipment towards system use, they would likely intend to use technology for teaching. This is in line with the findings of Chen Li (2019), who designed a research model and hypotheses that were consistent with the actual situations of this study and conducted an empirical study of the user's intention to use e-books in Fujian, China. It was found out that effort expectancy, facilitating conditions, and individual innovation significantly influenced the use intention. The facilitating conditions had a significant influence on the effort expectancy. Also, Eli, Craig, George, and Kwame (2018) reported that facilitating conditions had a significant influence on Massive Open Online Course (MOOC) usage among students. However, this finding negates the UTAUT theory which sees facilitating condition as a predictor of only used behaviour, and not of intention to use technology. Findings from this study implies that facilitating condition could predict intention as well as actual use behaviour.

This research also indicated that technology familiarity has no significant effect on pre-service teachers' intention to use technology for classroom instruction. This is corroborated by Yang (2015), who investigated the influence of people with technology familiarity on their willingness to pay for newly launched electronic products at Weber

State University. The result revealed no significant impact of the level of technology familiarity on their willingness to pay for the newly launched electronic products. The finding is also in agreement with Olibie and Ezenwanne's (2013) study to appraise the familiarity and use of ICT by home economics teachers in Anambra State Junior Secondary Schools. The findings showed that teachers' familiarity with the potential of ICT in home economics for instructional delivery was low and that teachers' familiarity with ICT resources had no significant impact on the level of technology use in the classroom. This might not be unconnected with the fact that technology is now a universal language that people of this generation are quite familiar with since they use technology for other un-instructional purposes like entertainment and social media engagement. So, many of these pre-service teachers could have been well familiar with the technology used for different purposes. Therefore, their intention to use technology for teaching might not be connected with technology familiarity.

Furthermore, the findings showed a significant negative direct effect of technological anxiety on pre-service teachers' intention to use technology for classroom instruction. The result implies that the more pre-service teachers exhibit technological anxiety, the less their intention to use technology during teaching. Awofala *et al* (2019) found out that, overall, the technological anxiety of lecturers will negatively influence the extent and the way technology is used in teaching. Similarly, Hong, Chan-Jer, Chien-Yun, Ming-Yueh, Pei-Hsin, and Lee (2012) indicate that greater technology anxiety was negatively associated with technology's perceived ease of use (PEU). In a study on computer achievement, attitude, and anxiety, researchers (Tsai and Tsai, 2003; Pellas, 2014; Rasouli, Alipour, and Ebrahim, 2018) found a significant association between students' meta-cognitive skills, computer use, and their level of computer anxiety. Hacer (2022) affirms that computer anxiety has been shown to make a significant difference in teachers' computer self-efficacy and attitude to use technology for instructional tasks. This could be due to the specific competencies required to utilise technology effectively in the classroom setting. Teachers who lack the required skills to use technology will not be willing to use it for teaching.

Attitude towards technology has a significant effect on pre-service teachers' intention to use technology for classroom instruction. This implies that the more pre-service teachers exhibit a positive attitude towards technology usage, the more likely pre-service teachers' intention to use technology during teaching and vice-versa. This is in agreement with the theory of reasoned action, the theory of planned behaviour and

Technology Acceptance Model (TAM), which postulate that attitude is one of the determinants of intention. In support of the importance of teachers' attitude towards computer use, Beri and Sharma (2019) provided evidence to suggest that the attitude of teachers is directly related to computer use in the classroom.

A study by Ifenthaler and Schweinbenz (2013) examined teachers' attitudes toward technology after exposure to technology use. The goal of the study was to determine what teachers felt they needed to utilise technology appropriately. The findings showed that teachers' attitude significantly influenced their intention to use technology for classroom instruction. José, Migueláñez, and García-Peñalvo (2015) submit that pre-service teachers' show a positive attitude towards the inclusion of mobile devices during the future exercise of their jobs. Al-Fauzan and Hussein's (2017) findings indicate that attitude was a significant predictor of students' intention to use e-learning. As a result, it is seen that students' attitude plays an important role in contributing to the intention to use the e-learning system. This might be due to the strategic role of attitude in technology use among different categories of people in the society. Attitude remains a critical factor that determines the participation of individuals in any activity, especially the use of technology in the instructional process.

By contrast, Gotkas *et al* (2009) argued that having a positive attitude towards ICT is not sufficient to achieve effective and meaningful integration of ICT into the classroom environment. This contrary opinion might be because other important factors such as beliefs, self-confidence, technological knowledge, schools' culture, access, and leadership support could also play pivotal roles in technology use within the learning space.

Findings show that there was a significant direct effect of accessibility to technological resources on pre-service teachers' intention to use technology for classroom instruction. The result implies that the more pre-service teachers have access to technological resources, the more likely pre-service teachers' intention to use technology during teaching. This is corroborated by Amuchie (2015), who found out that ICT resources were not available in schools, to be used by teachers and students. This was a major hindrance to effective technology use for learning activities. Also, Aramide *et al* (2013), who discovered that positive relationships were established between the location of access and ICT use and the degree of accessibility and ICT use. A positive relationship was also established between the location of access and the degree of accessibility. Also, a significant joint relationship was established between

the location of ICT access, degree of ICT accessibility, and ICT use. However, the degree of accessibility was found to contribute more to ICT use among science teachers than the location of ICT access.

The result shows no significant interaction effect of extended UTAUT exogenous variables (performance expectancy, effort expectancy, social influence, and facilitating conditions) and voluntariness to use technology on pre-service teachers' intention to use technology for classroom instruction. The result implies that the causal effect of exogenous variables (performance expectancy, effort expectancy, social influence, and facilitating conditions) on the criterion, "pre-service teachers' intention to use technology for classroom instruction," in the extended UTAUT model was independent of the pre-service teachers' voluntariness to use technology. The interaction of voluntariness to use technology and performance expectancy has no significant causal effect on pre-service teachers' intention to use technology for classroom instruction. This might be because technology has pervaded every sector of human endeavour, and individuals now see it as a way of life. Thus, prospective teachers need not be forced to use digital devices to facilitate instruction. Bello and Hamzat (2020) affirmed that the modern classroom settings are increasingly becoming technology-based, and the use of digital tools is at the threshold of becoming a strategic medium to engage 21st century learners who live in media-saturated environments.

Findings showed that there was no significant interaction effect of extended UTAUT exogenous variables (performance expectancy, effort expectancy, social influence, and facilitating conditions) and experience in the use of technological devices on pre-service teachers' intention to use technology for classroom instruction. The result implied that the causal effect of exogenous variables (performance expectancy, effort expectancy, social influence, and facilitating conditions) on the criterion, "pre-service teachers' intention to use technology for classroom instruction," in the extended UTAUT was independent of the pre-service teachers' experience in the use of technological devices. This could be because technology has become a global language, and nearly everyone has experienced technology use no matter how little. Technology has become part of every pre-service teacher's life.

The result showed no significant interaction effect of extended UTAUT exogenous variables (performance expectancy, effort expectancy, social influence, and facilitating conditions) and future classroom size preference on pre-service teachers' intention to use technology for classroom instruction. The result implies that the causal

effect of exogenous variables (performance expectancy, effort expectancy, social influence, and facilitating conditions) on the criterion, "pre-service teachers' intention to use technology for classroom instruction," in the extended UTAUT was independent of the pre-service teachers' classroom size preference. This finding is in sharp contrast with those of Barnnet (2006), which found that clickers alter the very basis of classroom dynamics by giving students in overcrowded classes the power of feedback and interaction.

Similarly, Riffell and Sibley (2004) conducted a study on whether large undergraduate biology classes will stimulate the use of web-based instruction for the teaching-learning process. Findings revealed that teachers were enthusiastic about using technology in large classes. It stimulates the quality of interaction with the students; the frequency with which students contacted lecturers and fellow students dramatically improved; students access instructional content more frequently and engage in group discussions. This could be due to the increasing use of technology to engage various categories of learners in the classroom. Regardless of the class size, teachers across different levels of education are increasingly leveraging technology to facilitate the instructional delivery process. With the advancement in technological innovations, web-based learning platforms like Virtual Learning Environment (VLE) give teachers the capabilities to engage learners in the instructional process, regardless of the class size.

Also, findings indicated that there was no significant interaction effect of extended UTAUT exogenous variables (performance expectancy, effort expectancy, social influence, and facilitating conditions) and gender on pre-service teachers' intention to use technology for classroom instruction. The result implies that the causal effect of exogenous variables (performance expectancy, effort expectancy, social influence, and facilitating conditions) on the criterion, "pre-service teachers' intention to use technology for classroom instruction," in the extended UTAUT was independent of the pre-service teachers' genders.

Furthermore, the result implies that the causal effect of technology familiarity on the criterion, "pre-service teachers' intention to use technology for classroom instruction," in the extended UTAUT model, is independent of the pre-service teachers' genders. This might not be unconnected with the fact that the digital gender divide is shrinking with the increasing use of technology in all aspects of human endeavour. According to OECD Report (2018), the Internet, digital platforms, mobile phones, and

digital financial services offer “leapfrog” opportunities for all and can help bridge the divide by giving women the possibility to earn additional income, increase their employment opportunities, and access knowledge and general information.

The result also shows no significant interaction effect of extended UTAUT exogenous variables (performance expectancy, effort expectancy, social influence, and facilitating conditions) and age on pre-service teachers’ intention to use technology for classroom instruction. The result implies that the causal effect of exogenous variables on the criterion, “pre-service teachers’ intention to use technology for classroom instruction,” in the extended UTAUT, is independent of the pre-service teachers’ age. This is contrary to Olson, Nolin and Nelhans, (2015), who reported that younger adults report significantly more use than older adults and are more experienced with complex operations and technologies in most technology cities. These inconsistencies in the findings might be because pre-service teachers used for this study can be categorised as younger adults, who are likely technology-savvy. These prospective teachers daily utilise technology for social engagements and will likely use the same for educational purposes.

Findings from the research revealed that there was no significant interaction effect of extended UTAUT exogenous variables (performance expectancy, effort expectancy, social influence, and facilitating conditions) and school location preference on pre-service teachers’ intention to use technology for classroom instruction, except for the interaction effect of facilitating conditions and school location preference on pre-service teachers’ intention to use technology for classroom instruction. The result implies that the causal effect of exogenous variables (performance expectancy, effort expectancy, social influence, and facilitating conditions) on the criterion, "pre-service teachers’ intention to use technology for classroom instruction," in the extended UTAUT model, was independent of the pre-service teachers’ school location preference.

Furthermore, the result implies that the causal effect of facilitating conditions on the criterion, "pre-service teachers’ intention to use technology for classroom instruction," in the extended UTAUT model, is dependent of the pre-service teachers’ school location preference. This implies that the pre-service teachers prefer to teach in areas where there are facilitating conditions. That is, where they would have the support of the school authority to use technology, and where technological resources would be available and accessible to them to be used for teaching.

It is important to note that scholars across the world have extended the UTAUT model in some geographical regions. Sarfaraz (2017) used primary data from 340 mobile banking users to study the drivers of mobile banking adoption in Jordan within the framework of the unified theory of acceptance and use of technology (UTAUT) model. To localise the model in the Jordanian context, the study includes risk perception and trust factors as constructs to extend the UTAUT model. Data collected were analysed using Structural Equation Modelling (SEM) to predict the UTAUT factors that can influence users' behavioural intention to adopt mobile banking. The result revealed that performance expectancy, effort expectancy, and risk perception significantly influence mobile banking user's intention to adopt mobile banking services, and no significant relationship could be established for social influence and trust factors.

Also, Raza, Qazi, Khan, and Salam (2021) extended the UTAUT model with social isolation and Corona fear on Behavioral Intention of using the Learning Management System. The data was analysed using Partial Least Square (PLS) and Structural Equation Modelling (SEM). The findings show a positive link of Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Social Isolation on Behavioral Intention to use LMS and, also, between Behavioral Intention of LMS and its use behaviour. The results of the moderation analysis show that Corona fears only moderate the link of performance expectancy and social influence with behavioral intention to use LMS.

This implies that UTAUT models have been extended to determine technology used in different contexts, and it is paramount that the model is extended with indigenous factors in this part of the world. This could provide a workable framework for effective technology integration in our teaching-learning process.

4.3 Summary of Findings

Results revealed that:

1. Pre-service teachers' intention to use technology for teaching was sufficiently predicted by the combination of Performance Expectancy (PE), Effort Expectancy (EE), Facilitating Condition (FC), Technological Anxiety (TA), Attitude Towards Technology (ATT) and Accessibility to Technological Resources (ACC).

2. The extended UTAUT model jointly accounted for 52.0% of the variance observed in pre-service teachers' intention to teach with technology. This implies that the extended UTAUT model can predict intention of one out of every two pre-service teachers.
3. The hypothesised extended UTAUT model with the combination of Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Condition (FC), Technology Familiarity (TF), Technological Anxiety (TA), Attitude Towards Technology Use (ATT) and Accessibility to Technological Resources (ACC) do not provide a substantial explanation for pre-service teachers' intention to use technology for teaching-learning activities.
4. Among other factors, technological anxiety was the most important factor in the prediction of pre-service teachers' intention to teach using technology, followed by attitude towards technology, accessibility to technological resources, effort expectancy, facilitating conditions, and lastly by performance expectancy in sequential order.
5. The more the pre-service teachers perceived that technology would assist them in their job performance, the more their intention to use technology during teaching.
6. The more the pre-service teachers perceived that the usage of technology requires less effort in the performance of their teaching job, the more their intention to use technology during teaching and vice-versa.
7. Whether the pre-service teachers are influenced socially by their families, friends, school authority et cetera, or not, it does not have anything to do with their intention to teach with technology in future.
8. The more the pre-service teachers perceived that they would enjoy support from the school organisation, and the more the availability of technically related equipment towards systems use, the more their intention to use technology during teaching.
9. Much attention should not be given to technology familiarity as one of the factors to predict intention to use technology for classroom instruction among pre-service teachers.
10. The more pre-service teachers exhibit technological anxiety, the less they intend to teach with technology in the future, and vice-versa.

11. The more the pre-service teachers exhibit a positive attitude towards technology usage, the more likely their intention to use technology during teaching and vice-versa.
12. The more the pre-service teachers have access to technological resources, the more their intention to use technology for teaching.
13. The pre-service teachers' intention to teach with technology has nothing to do with whether the pre-service teachers were forced to use the technology or whether technology use is of free will.
14. The pre-service teachers' intention to teach with technology is not influenced by their prior experience in the use of technological devices.
15. The pre-service teachers' intention to use technology for classroom instruction has nothing to do with whether their future classroom size is large or small.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of the Study

The Unified Theory of Acceptance and Use of Technology (UTAUT) model was extended in this study to predict pre-service teachers' intention to teach with technology in southwestern Nigeria. The UTAUT model which comprises Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI) and Facilitating Condition (FC) was extended with local or domestic variables such as technology familiarity, technological anxiety, attitude towards technology use and accessibility to technological resources. The background of the study discussed issues ranging from the usefulness of technology in education to low acceptance of technology by the majority of teachers, especially in Nigeria, which in turn led to non-usage of technology for teaching. The effectiveness of the UTAUT model in understanding the drivers of acceptance of technology, the moderating effect of school location preference and classroom size preference, in addition to age, gender, experience and voluntariness of use of technology which are moderating variables in the original UTAUT model, was also investigated on pre-service teachers' intention to teach with technology in the classroom, leading to the presentation of the study's problem statement, raising of six research questions and formulating and testing of two null hypothesis at 0.05 level of significance. In addition, the scope and significance of the study were also highlighted in chapter one.

Chapter Two of the study is centred on the theoretical framework, the conceptual and empirical reviews on the research problem. The chapter essentially reviews various assumptions and relevance of the Technology Acceptance Model (TAM) and the unified theory of acceptance and use of technology to determine the bahvioural intention of pre-service teachers in Nigeria. It comprises conceptual reviews of the rationales for using models in educational practices, technology usage to facilitate instructional delivery, technology acceptance among Nigerian teachers, pre-service teachers education in Nigeria, pre-service teachers' intention to teach with technology in the classroom, studies on teachers' technology familiarity in instructional delivery, teachers' technological anxiety in the classroom, teachers' attitude to technology use

for instructional delivery and accessibility to technological resources. The empirical reviews dispensed previous related studies on the pre-service teachers' intention to use technology for classroom instruction, performance expectancy and intention to use technology in the classroom, social influence and intention to use technology in the classroom, facilitating condition and intention to teach with technology in the classroom, pre-service teachers' technology familiarity and intention to use technology, pre-service teachers' technological anxiety and intention to use technology, pre-service teacher's attitude towards technology and intention to teach with technology, accessibility to technological resources and intention to teach with technology, future school location preference and intention to use technology, future classroom size preference and teachers' intention to teach with technology. In addition, the literature was also appraised.

Chapter Three presented the methodology of the study. The study adopted the mixed methods research design of sequential explanatory type (qual + QUAN). The quantitative aspect of the research adopted the descriptive survey research design type while the qualitative part adopted the use of preliminary investigation and focus group discussion. The variables of the study, subject selection, research instruments and procedure, methods of data collection and analysis were also discussed. The study was in three stages. Stage one dealt with a preliminary investigation which was carried out with 36 students from a College of Education (COE) and 23 students from a university to explore other factors that were germane to teachers' intention to teach with technology than the original UTAUT variables. The factors generated were Technology familiarity (TF), Technological anxiety (TA), Attitude towards technology use (ATT) and Accessibility to technological resources (ACC) which were loaded high upon subjection to factor analysis. The thematic analysis of the preliminary investigation and focus group discussion was also presented in chapter three. In stage two, a new model was built to examine UTAUT variables with its extension on pre-service teachers' intention to teach with technology. Six public universities and six colleges of education were randomly selected from southwestern states in Nigeria (one university and one college of education from each state). The states are Ekiti, Lagos, Ogun, Ondo, Osun and Oyo states. The participants comprise part three students in colleges of education (1,333) and 400 level undergraduates (985) who were purposively selected, having been exposed to teaching practice and micro-teaching exercise. Eleven research instruments were used to collect data, and the study lasted eight weeks. Data collected were

analysed using Pearson's product moment correlation and Partial least square structural equation modelling (PLS-SEM). In stage three, Focus Group Discussion was carried out with the pre-service teachers to affirm the variables generated during the preliminary investigation, and also to find out whether there would be new other factors that would determine teachers' intention to teach with technology.

Chapter Four presented the results, interpretations and discussion of findings. The first section presents answers to the six research questions while the second section addressed testing of the null hypothesis raised at 0.05 level of significance. The third section focused on the discussion and summary of findings respectively. The findings of this study revealed that pre-service teachers' behavioural intention was sufficiently predicted by a combination of performance expectancy, effort expectancy, facilitating condition, technological anxiety, attitude towards technology use and accessibility to technological resources. The extended UTAUT model accounted for 52 percent of the variance observed in pre-service teachers' behavioural intention; the most important variable in the prediction of pre-service teachers' behavioural intention was technological anxiety; there was a significant direct causal effect of attitude to technology use, effort expectancy, performance expectancy, accessibility to technological resources and facilitating condition on behavioural intention but not on social influence and technology familiarity. There was a significant negative causal effect of technological anxiety on pre-service teachers' behavioural intention. Also, the pre-service teachers' behavioural intention was invariant of the tertiary institution type. The extended model also predicted other factors than the original UTAUT model. The summary of the study, conclusion and recommendation were discussed in this chapter.

5.2 Conclusion

This study was designed to examine the extension of the UTAUT model in predicting pre-service teachers' intention to teach with technology in their future classrooms in Nigeria. The original UTAUT model comprising exogenous variables such as performance expectancy, effort expectancy, social influence, and facilitating condition was extended with exogenous variables suggested by the pre-service teachers such as technology familiarity, technological anxiety, attitude towards technology, and accessibility to technological resources. In the same vein, moderating variables in the original UTAUT model such as age, gender, experience, and voluntariness of use of

technology were also extended with variables like school location preference and classroom size preference.

It was, deduced that the extended UTAUT model that explains pre-service teachers' intention to use technology for teaching consists of performance expectancy, effort expectancy, facilitating condition, technological anxiety, attitude towards technology, accessibility to technological resources and intention to use technology for teaching. These variables were consistent with empirical data.

5.3 Educational Implications of study

This study proffers solutions to overcome the recurrent challenges of low technology usage among teachers in Nigeria, by extending the UTAUT Model with some locally generated factors peculiar to the Nigerian situation to determine their influence on pre-service teachers' intention to use technology to teach in Southwest Nigeria. The following are the educational implications of the study:

i. Unlike the former existing models of users' acceptability that have restriction to developed countries, the extended UTAUT model in this study has been empirically proven to be relevant to developing regions like Nigeria.
ii. The extended model would assist the stakeholders in recruiting the right type of teachers that would be 21st century compliant. In other words, the extended model would assist the employer of teachers to identify teachers who have intention to teach with technology during interview with them.
iii. The study had indicated that the pre-service teachers have the intention to use technology in their future classroom activities, which will, in turn, lead to effective technology integration in schools.
iv. This extended model has provided a veritable framework for effective technology integration efforts at different levels of education.
v. There is the need to incorporate the newly identified factors in the formulation and implementation of ICT policy on teaching and learning in Nigeria.

5.4 Limitations of the Study

There were constraints in the course of this study. These are:

i. Self-report instrument (Questionnaire) was used to generate data in the study therefore, the findings are subject to the perception of the respondents.

ii. Two of those people who would have given the best support as research assistants were not on ground during the field work.

However, in spite of the limitations, findings of the study are still relevant and valid.

5.5 Recommendations

The following recommendations are made based on the findings from this study:

i. Educational stakeholders could utilise this extended UTAUT model to understand the factors that influence teachers' acceptance and use of technology in the educational system and consider those factors in preparing pre-service teachers towards teaching with technology right from their preparatory stage.

ii. Efforts should be made to improve the level of technology usage competence of pre-service teachers through adequate capacity building on technology use so that they could acquire skills that would significantly improve their technological skills, and they would not develop anxiety for technology use.

iii. Technology should be institutionalised and streamlined into teaching and learning so that pre-service teachers would see the need to use technology in their future classroom practices. In other words, lecturers should update their ICT skills to teach pre-service teachers with technology and also allow them (pre-service teachers) to practise how to teach with technological tools in the future.

iv. Educational stakeholders should consider variables in this extended UTAUT model when recruiting teachers into schools in the nearest future.

v. Stakeholders should consider these extended UTAUT variables in the planning and implementation of technology intervention in the education system.

vi. Government and school owners at all levels should ensure the provision of technological resources and be sure of adequate access to these resources by teachers in order to promote the effective use of technology to enhance the teaching-learning process.

vii. Teachers should be enlightened to understand the need for appropriate use of technology, which could stimulate a positive attitude to technology integration efforts at different levels of education.

viii. It is recommended that technologies that could help in teaching and would be user's friendly be provided in schools for teachers because those factors determine the intention of pre-service teachers to use technology.

ix. Awareness should be created so that pre-service teachers would know that being inexperienced in the use of technology is not a limitation to intention to use technology for teaching.

5.6 Contributions to Knowledge

The study has contributed to knowledge in the following ways; it established that:

i. The UTAUT model has been extended, and would be useful in predicting teachers' intention to teach with technology in Nigeria

ii. The extended UTAUT model was able to enhance the prediction of pre-service teachers' intention to teach with technology in south-west Nigeria.

iii. The extended UTAUT model predicted other factors than the original UTAUT model

iv. Technological competence of teachers is paramount to their intention to use technology in teaching and should be addressed during teachers' training programme.

v. Having a positive attitude by teachers would enhance their intention to teach with technology and, in turn, make their learners benefit immensely from their teachings.

vi. Availability and accessibility of technological resources would influence the rate of technology acceptance among prospective teachers.

vii. Adequate provision of technological resources for teachers would motivate them to utilise technology in the discharge of their duties.

5.7 Suggestions for Further Studies

i. A future study could be extended to cover more regions in Nigeria to reflect dynamism in the intention of pre-service teachers to use technology in their future classrooms.

ii. It would be worthwhile to research the level of technology usage by this set of pre-service teachers in the future.

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APPENDIX I
THE UNIVERSITY OF IBADAN
DEPARTMENT OF SCIENCE AND TECHNOLOGY EDUCATION
EDUCATIONAL TECHNOLOGY UNIT

QUESTIONNAIRE ON ADAPTED UTAUT CONSTRUCTS

Dear Respondents,

I am a post-graduate student of the department named above researching pre-service teachers' intention to use technology to teach in the classroom as part of the requirements for the award of a Ph.D. degree in Educational Technology. Kindly assist by supplying the necessary information to the items in the questionnaire. All information provided will be treated with utmost confidentiality. Thank you for your cooperation.

Instruction

This questionnaire is designed to examine the original UTAUT constructs on pre-service teachers' intention to use technology in the classroom. The data generated would be used for research purposes only, and all information provided would be treated with complete confidentiality. Please tick (√) the appropriate box that corresponds with your opinion.

Name of school: .....

Sex: Male ( ) Female ( )

Age:16-20 years ( ) 21-25 years ( ) 26-30 years ( ) 30 years above ( )

School Location Preference: In future classroom practices, I would prefer to teach in schools located in: Rural ( )Urban ( ) Rural or Urban ( ) areas

Classroom Size Preference: In future classroom practices, I would prefer to teach in classroom with class size of: 0-30 learners ( ) 31-60 learners ( ) 60 learners and above ( )

Voluntariness of Use of Technology: Whether I am mandated to use technology or not, I will teach with technology in my future classroom. Yes ( ) No ( )

Experience: For how long have you been using technology? **…….**

SA – Strongly Agree A – Agree D – Disagree SD – Strongly Disagr

SECTION A: Performance Expectancy

S/N	ITEMS	SA	A	D	SD
1.	Technology increases the chances of achieving instructional objectives.				
2.	Using technology allows teachers to accomplish instructional tasks more easily.				
3.	Technology could increase teachers' productivity in instructional settings.`				
4.	Different technological tools could help teachers engage students in instructional content.				
5.	Technology makes learning interactive.				
6.	Technology makes learning fun.				
7.	Technology stimulates students' interest in teaching-learning activities.				
8.	Technology makes learning more real.				
9.	I feel that using technology in my professional practice will improve my students' grades.				

Effort Expectancy

S/N	ITEMS	SA	A	D	SD
1.	Learning how to use technology is quite easy.				
2.	Technology does not require formal training for it to be used in teaching and learning activities.				
3.	Every pre-service teacher can easily use technology for classroom instruction.				
4.	Technology allows clear and understandable interaction.				
5.	Technology is very difficult to use in the classroom.				
6.	It is easy for pre-service teachers to acquire the necessary skills to use technology for instructional delivery.				
7.	Technological revolution necessitates the need for pre-service teachers to acquire skills to use technology for instructional delivery.				

Social Influence

S/N	ITEMS	SA	A	D	SD
1.	People who are important to me believe that I could use technology for classroom instruction.				
2.	My colleagues could influence my decision to use technology in the classroom.				
3.	The principal could encourage teachers to use technology for classroom instruction.				
4.	My colleagues could discourage me from using technology for instructional delivery.				
5.	My college lecturers believe that technology could be used for classroom instruction.				
6.	Many parents do not believe pre-service teachers could use technology to engage students in the classroom.				
7.	My parents provide necessary resources that could influence my decision to use technology for instructional delivery.				

Facilitating Condition

S/N	ITEMS	SA	A	D	SD
1.	My training as a teacher has exposed me to knowledge that could encourage my intention to use technology in future classrooms.				
2.	I have the requisite skills to aid my intention to use technology in future classrooms.				
3.	Availability of regular power supply can aid my intention to use technology in future classrooms.				
4.	Compatibility of Internet facilities with other technologies that can be used in the classroom could aid my intention to teach with technology.				

5.	I will teach with technology if help is readily available in schools, for teachers having difficulty in teaching with technology.				
6.	If the government provides the necessary support to ensure technology use in schools, I will teach with technology.				
7.	Provision of necessary funding by the government could facilitate the use of technology in the classroom.				
8.	My students' attitude to technology would determine my intention to use digital tools for classroom instruction.				
9.	My students' familiarity with technology would encourage my intention to teach with technology in future.				
10.	I will prefer to use technology, if the resources are made available.				
11.	Technological tools are not usually available in some schools, and this could affect my intention to use technology for instruction.				

APPENDIX II

SECTION B: QUESTIONNAIRE ON PRE-SERVICE TEACHERS' TECHNOLOGY FAMILIARITY

VF- Very Familiar; F- Familiar; LF- Less Familiar; NF- Not Familiar

How familiar are you with the following instructional tasks/tools?

S/N	ITEMS	VF	F	LF	NF
1.	Using interactive whiteboards to engage learners in the instructional process.				
2.	Creating digital stories for instructional purposes.				
3.	Using presentation tools like PowerPoint and Prezi to enhance instructional delivery.				
4.	Creating instructional videos.				
5.	Using mobile phones for instructional purposes.				
6.	Using multi-media projectors for classroom activities.				
7.	Creating audio clips for instructional purpose.				
8.	Using the Internet to search for appropriate instructional content.				
9.	Using online learning platforms like Edmodo and Schoology in instructional delivery.				
10.	Using Microsoft Word to prepare instructional content.				
11.	Using Excel to prepare instructional content.				

APPENDIX III

SECTION C: TECHNOLOGY ANXIETY SCALE

SA – Strongly Agree A – Agree D – Disagree SD – Strongly Disagree

S/N	ITEMS	SA	A	D	SD
1.	It scares me whenever I think that I could alter instructional content by hitting the wrong key on a computer.				
2.	I hesitate to use technology for fear of making mistakes I cannot correct.				
3.	Technologies are somewhat intimidating to me.				
4.	I look forward to using technology in my future career.				
5.	I feel insecure about my ability to operate technological devices without help from my friends.				
6.	The challenge of learning with technology is exciting.				
7.	Anyone can learn to use technology if he/she is patient.				
8.	Learning to operate digital devices to perform classroom activities is like learning any new skill – the more you practise, the better you become.				
9.	I am worried that if I begin to use technology to learn, I will lose some of my reasoning skills.				
10.	Only brilliant students can understand all the special keys contained in most technology gadgets.				
11.	I feel technologies are not necessary in educational settings.				
12.	Every student has some level of technology anxiety.				

Adapted from Heinssen, Glass and Knight (1987)

APPENDIX IV

SECTION D: QUESTIONNAIRE ON PRE-SERVICE TEACHERS' ATTITUDE TOWARDS TECHNOLOGY

SA – Strongly Agree A – Agree D – Disagree SD – Strongly Disagree

S/N	Attitude Towards Technology Use	SA	A	D	SD
1.	Technology helps in improving the way lessons are presented in the classroom.				
2.	Technology allows teachers to do more interesting and imaginative work in the classroom.				
3.	Teachers do not need to teach with technology as they can as well perform most of the functions that any technological tool could be used to do in the classroom				
4.	Technology enhances the presentation of ones' work as a teacher, to a degree which justifies the extra effort.				
5.	If given the opportunity, I would like to learn how to use technology to carry out classroom activities.				
6.	Using technology to teach in the classroom does not make teachers to be in complete control				
7.	Technological skill is a must for pre-service teachers in order to cope with the demands of teaching-learning activities				
8.	It is better for a teacher, to avoid taking a job if s/he knew it involves working with technology.				
9.	Using technology can promote interactive teaching-learning process.				
10.	Technology should be used for instruction only when teachers are forced to do so.				
11.	It is better to always avoid coming in contact with technological tools in school				

12.	Adopting traditional mode of teaching is preferable to teaching with technological tools.				
13.	Using technological tools to deliver instruction in the classroom is enjoyable				
14.	It is believed that using technology in the classroom is tedious and time consuming.				
15.	It would be preferable not to use technology to teach in any classroom.				
16.	All teachers should be encouraged to use technology for classroom instructions.				

Adopted from Selwyn, (1997)

APPENDIX V

SECTION E: QUESTIONNAIRE ON ACCESSIBILITY TO TECHNOLOGICAL RESOURCES

SA – Strongly Agree A – Agree D – Disagree SD – Strongly Disagree

	ITEMS	SA	A	D	SD
1	I can use technology only if resources are accessible.				
2	If I could easily access the computer-related devices, it would improve my intention to use technology for instruction.				
3	Access to technological resources does not translate to improved intention to use technology among pre-service teachers.				
4	Accessibility to the Internet and digital tools could influence my intention to use technology in the classroom.				
5	The rate of access to computer-related devices should be considered when planning for pre-service teachers to use technology for instruction.				
6	Pre-service teachers may not have access to the required technological resources like Internet and software in their future classrooms.				
7	Pre-service teachers should have the freedom to utilise the available resources to engage learners in the instructional process.				
8	I will not use technologies like interactive whiteboard and computers, even if I have the freedom to do so.				

APPENDIX VI

SECTION F: QUESTIONNAIRE ON PRE-SERVICE TEACHERS' INTENTION TO USE TECHNOLOGY

SA – Strongly Agree A – Agree D – Disagree SD – Strongly Disagree

S/N	ITEMS	SA	A	D	SD
1.	I do not plan to use technologies in my future classroom practices.				
2.	Without technology, teaching-learning activities can never be effective.				
3.	Technology will not be useful in my teaching at all.				
4.	I feel that using technology will be easy to incorporate into my future classroom.				
5.	It is important that I get properly trained in the use of technology, in order to be relevant in my future classroom.				
6.	To help my students learn the instructional content effectively, I intend to incorporate technologies in my future classroom.				
7.	Using technologies for my future classroom activities is entirely out of my control.				
8.	Using technologies fits well with the way I want to teach in the classroom.				
9.	Technology could alter my class activities, so I do not plan to use it.				
10.	I can teach without technology in my future classroom.				

APPENDIX VII

Preliminary Investigation Questions for Pre-Service Teacher's Intention to Teach with Technology in the Future

Instruction: This instrument allows pre-service teachers to express their opinions on the factors that could encourage or discourage them from wanting to use technology in their future classrooms. The information emanating from this discussion will help in providing a basis for adding to the existing factors predicting behavioural intention in the Unified Theory of Acceptance and Use of Technology (UTAUT) Model.

Question One: The focus of every teacher is to equip learners with adequate knowledge and skills to function effectively in society. Do you think using technology for instructional delivery could help you achieve the instructional objectives in your future classroom practices?

If yes, why?

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If no, why?

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Question Two: Do you intend to make use of technology in your future classroom activities?

If yes, why?

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If no, why?

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Probe: What are the technological tools known to you that can be used in the teaching-learning process?

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Question Three: What are the conditions that would prompt teachers' intention to use technology in the teaching-learning process?

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Probe: What are the conditions that will discourage teachers from wanting to use technology in the process of teaching?

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Probe: What do you think education stakeholders like the government, head of schools, and parents could do to stimulate teachers' intention to use technology for teaching-learning activities?

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Focus Group Discussion (FGD) for Pre-Service Teachers' Intention to Use Technology

Question One: As potential teachers who would be charged to teach the 21st century learners, would you like to adopt technology in your future classroom?

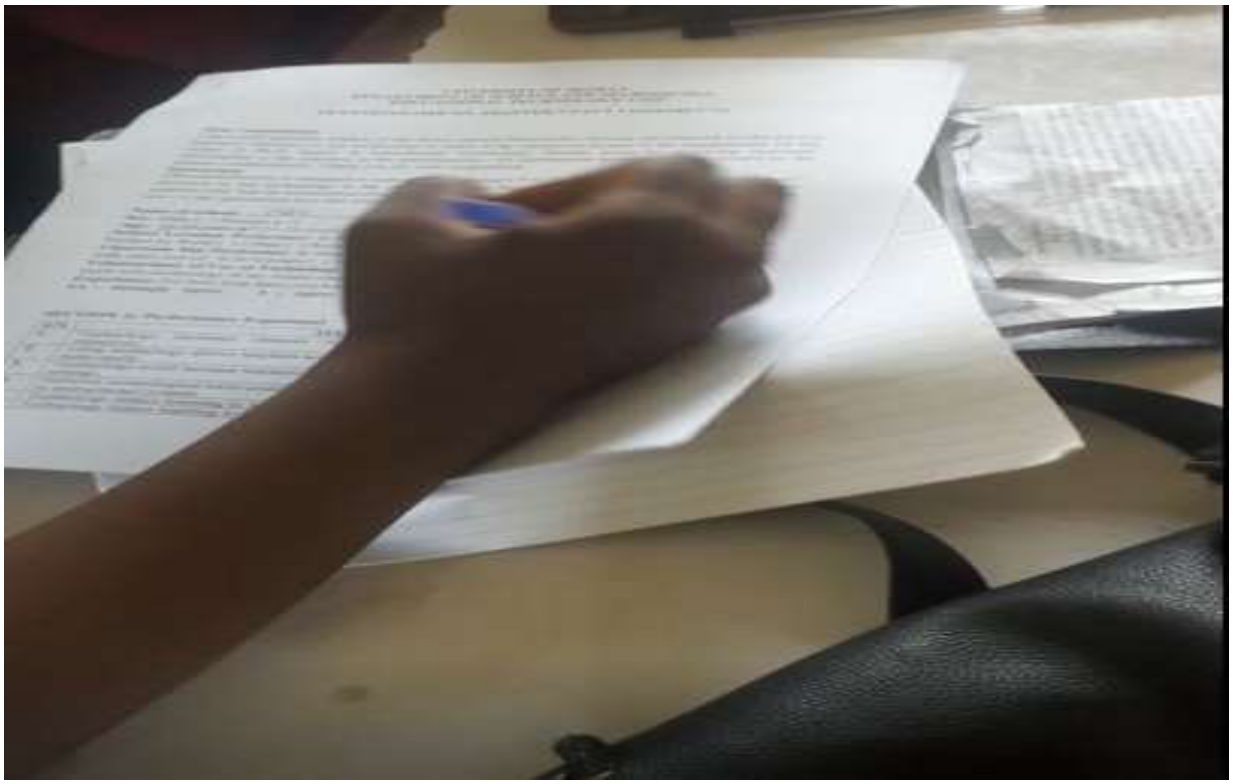
Question Two: What do you think would be hindrances or barriers to the adoption of technology in your future classroom?

Question Three: What are the technological devices you think you can use to teach your future learners?

Question Four: Have you heard about any Technology Acceptance Model like TAM, TAM 2 or UTAUT before now? What is your source of information?

APPENDIX VIII

Pictures from the field work

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