E-LEARNING ADOPTION MODEL FOR TERTIARY INSTITUTIONS IN SOUTHWEST NIGERIA

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DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF COMPUTER SCIENCE (APPLIED COMPUTING)

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E-LEARNING ADOPTION MODEL FOR TERTIARY INSTITUTIONS IN SOUTHWEST NIGERIA

ABSTRACT

The adoption of E-learning model in tertiary institutions in Nigerian cannot be over emphasized, as the model has grown over time and has been implemented across other institutions, mostly private institutions in Nigeria. The research focuses on adopting a model for the implementation of E-learning across universities in South West Nigeria. The literature review shows that factors such as perceived ease of use, perceived usefulness, e-learning self-efficacy, perceived barriers, intention to use, perceived instructor quality, perceived satisfaction, technological skills, perceived cost, instructional environment and learning styles, impact E-learning adoption. A case study of federal universities in South West Nigeria was utilized, alongside quantitative research of which questionnaire was employed as the research instrument. A total of 370 correspondents participated across 5 federal universities in South West Nigeria. The reliability test showed a value of 0.881 and was considered valid. The regression analysis indicated that perceived ease of use, intention to use, e-learning self-efficacy, perceived barriers, perceived usefulness, instructional environment, and learning style have a relationship with E-learning adoption. A new model was proposed based on the regression analysis. Thus, the researcher recommends that e-learning adoption in tertiary institutions in Southwest Nigeria should be enhanced by creating enabling instructional environment as well as taking into account the learning styles of students.

Keywords: E-learning, E-learning Model, Perceived Ease of Use, Self-efficacy, Intention to Use

MODEL PENGGUNAAN E-PEMBELAJARAN UNTUK INSTITUSI TERTIARI DI SOUTHWEST NIGERIA

ABSTRAK

Penggunaan model E-Pembelajaran di institusi pengajian tinggi di Nigeria tidak asing lagi, kerana model ini telah berkembang dari masa ke masa dan telah dilaksanakan di institusi lain, dan kebanyakannya institusi swasta di Nigeria. Penyelidikan ini telah memberi tumpuan kepada pengguna model untuk pelaksanaan E-Pembelajaran di seluruh universiti di Selatan. Kajian kesusasteraan menunjukkan bahawa faktor-faktor seperti penggunaannya yang mudah, serba guna, keberkesanan kendiri E-Pembelajaran, rintangan yang jelas, berniat untuk menggunakan, kualiti pengajar yang dilihat, kepuasan yang dirasakan, kemahiran teknologi, perbelanjaan, persekitaran pengajaran dan gaya pembelajaran memberi kesan kepada penggunaan E-Pembelajaran. Kajian kes universiti persekutuan di Nigeria Barat telah dilakukan, penyelidikan kuantitatif telah dijalankan bersama dengan soal selidik sebagai alat penyelidikan. Sejumlah 370 peserta mengambil bahagian di 5 universiti persekutuan di Nigeria Barat Daya. Ujian kebolehpercayaan menunjukkan nilai 0.881 dan dianggap sah. Analisis regresi menunjukkan bahawa kemudahan yang dirasakan oleh pengguna, berniat untuk menggunakan, keberkesanan kendiri E-Pembelajaran, rintangan yang jelas, serba guna, persekitaran pengajaran, gaya pembelajaran mempunyai hubungan dengan E-Pembelajaran. Model baru telah dibangunkan berdasarkan analisis regresi.

Kata kunci: E-learning, Model E-learning, Perceived Ease of Use, Self-efficacy, Niat untuk Menggunakan

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LIST OF SYMBOLS AND ABBREVIATIONS

PEOU :   Perceived Ease Of Use

PU: Perceived Usefulness

ELSE: E-Learning Self-Efficacy

PB: Perceived Barriers

ITU: Intention To Use

PIQ: Perceived Instructor Quality

PS: Perceived Satisfaction

TS: Technological Skills

PC: Perceived Cost

ELA: E-Learning Adoption

TAM: Technological Acceptance Model

LS: Learning Style

IE: Instructional Environment

UDLT: Universal Design Learning Theory

MMR: Multiple Means of Representation

MME: Multiple Means of Engagement

MMAE: Multiple Means of Actions and Expression

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CHAPTER 1: INTRODUCTION

1.1 Preamble

This chapter presents the overall viewpoint of the thesis. It starts by giving background on the subject of e-learning and e-learning adoption in developing countries, with emphasis on Nigeria, as well as revealing some factors responsible for the present level of adoption of e-learning in Nigeria. More so, the problem statement, research scope, objectives, and questions, along with the significance of the study, are all presented in this chapter.

1.2 E-Learning: An Overview

Indisputably, remarkable developments and innovations in the Information and Communication Technologies (ICTs) over the years have obviously revolutionized teaching and learning in tertiary institutions across the globe, particularly through the information systems which make available resources for research and learning for both teachers and students to share and acquire information conveniently online without geographical barriers (Al-Azwei, 2016; Yakubu & Dansuk, 2018). However, the teaching and learning practices largely adopted in many countries in Sub-Saharan Africa, especially Nigeria, have been via traditional approaches which require physical contact of teachers and students (Amirkhanpour, et al., 2014), hence the need to adequately adopt e-learning technology to enhance teaching and learning, as well as to reduce geographical limitations posed by the conventional teaching and learning patterns in tertiary institutions within Africa. E-learning has enabled tertiary institutions to expand their current geographical reach, to capitalize on new prospective students and to establish themselves as global educational providers (Tan & Hsu, 2017).

According to Yakubu and Dansuki (2018), e-Learning is a product of the evolution of the learning process due to the application of ICT in the classroom. The term "e-learning" stands for electronic learning, which involves creating and delivering educational programs using images, texts, video, audio, and other electronic formats via computer terminals. (Prof. Chriatian A. Oduma et al, 2019). It is the use of ICT to teach without geographical limitations (Kyari et al., 2018). Some notable e-learning technologies used in Nigeria include Zoom Cloud, WhatsApp, e-library, Google classroom, students' portal, e-mail, U-lesson App., Radio, Television, Mobile classroom and Learning Management Systems (LMS).

The importance of e-learning cannot be overemphasized in the present ICT-oriented society. E-learning in tertiary institutions has several benefits, it has been recognized as one of the best methods of education which promotes distance learning (Klein and Ware, 2003; Algahtani, 2011). It is flexible when issues of time and place are taken into consideration. For instance, every student has the luxury of choosing the place and time that suits him/her. This is supported by Smedley (2010) who stated that e-learning provides the institutions as well as their students or learners the much flexibility of time and place of delivery or receipt according to learning information. In addition, it enhances the efficacy of knowledge and qualifications via ease of access to a huge amount of information and able to provide opportunities for relations between learners by the use of discussion forums (Arkorful & Abaidoo, 2014).

Deductively, e-learning helps eliminate physical and geographical barriers that have the potential of hindering education. Eklund, Kay, and Lynch (2013) affirmed that, e-learning is a broad range of applications and processes that leverage all accessible electronic media to deliver education and training. E-learning is a component of flexible learning. People can study in a flexible and individualized way, thanks to it. It lowers the cost of learning and provides options for learning on demand. It is cost effective not only

in reducing frequent traveling of students to respective institutions but also offers opportunities for learning to maximum number of students without the need for many buildings (Arkorful and Abaidoo, 2014). According to Holley (2012), students in higher education who used e-learning generally outperformed those who took face-to-face classes. Additionally, he found that students who participate in online and distance learning obtain higher grades than those who study or use traditional methods. Because of this discovery, e-learning is becoming more and more popular, and higher education institutions are embracing it, as it's accommodate individual student differences.

1.3   E-Learning Adoption in Nigeria

E-learning Adoption (ELA) is the level of acceptance and use of e-learning systems by users (Naciye & Aykut, 2018). Notably, e-learning has been highly adopted in some tertiary institutions in the developed countries of the world to facilitate teaching and learning (Al-Azweil, 2016). However, the case is quite different in developing countries. Evidently, it can be observed that e-learning is gradually becoming one of the educational technologies adopted in tertiary institutions of developing countries due to the widespread and growth of ICT. Yet, studies reveal that there is still a significant reluctance to adopting e-learning in tertiary institutions in developing countries (Marangunic & Granic, 2015, Almaiah, Jalil, & Man, 2016; Damnjanovic, Jednak, & Mijatovic, 2015). Corroboratively, Al-Azwei (2016) clearly stated that a high failure rate is linked to e-learning, most especially in developing nations because of the lack of public acceptability. This is true for Nigeria with very low adoption rate of e-learning (Nwabufo et al., 2012, Almaiah, Al-Khasawneh & Althunibat, 2020), obviously observed during the prevailing pandemic (COVID-19), especially in public tertiary institutions of Nigeria. It was observed that majority of the public tertiary institutions in Nigeria were unable to adopt e-learning

systems to salvage education of citizens from unexpected effects of the novel pandemic. This is clearly as a result of many factors.

More so, studies reveal that there are multiple factors affecting e-learning adoption in Nigerian tertiary institutions. These mostly include environmental factors such as technological, instructional, administrative, technical and infrastructural variables, as well as cultural and individual differences (particularly learning styles) (Almaiah, Al-Khasawneh & Althunibat, 2020; Anene, Imam & Odumuh, 2014; Yakubu & Dansuk, 2018; Ramzani & Suleiman, 2019; Oye, Mazleena & Lahad, 2011).

1.4   Problem Statement

1.5   Justification of the Study

A classroom with one or more instructors and students coming together physically and in real time has historically been the most typical setting for teaching and learning in Nigeria. However, the astonishing advancements and breakthroughs in technology have greatly aided in the global revolutionization of the teaching and learning process. Despite this, Nigeria has faced numerous difficulties, the most of which have been rejections and failures brought on by issues with the instructional environment and learning style, which have rendered the current e-learning model used by some higher institutions inefficient. Al-Azwei (2016) asserted and confirmed that e-learning has a high failure rate, particularly in developing countries where it is practically true for Nigeria due to a lack of public acceptance.

The adoption of the e-learning paradigm in tertiary institutions in Nigeria, primarily in the South-western region of the country, is being seriously influenced by problems, prospects, and perceptions, as noted by Yakubu & Dansuk (2018), Anene et al (2014), and Al-Azwei (2016). In order to establish a workable model for the deployment of E-

learning across universities in the Southwest of Nigeria, there is a tremendous need to analyse these limiting issues and then look for ways to improve them. This was summarize by other experts that the availability of the technology is not a requirement for the success of e-learning systems which is the focus of many experts presentation using Nigeria as case study.

Due to disparities in terms of culture and societal effect, the issue emerges when the system is not created with the students' perspective in mind. For the successful implementation of e-learning systems, it is imperative to record users' opinions and needs in accordance with the local context. A few experts have emphasized the necessity to develop the theoretical and conceptual framework for e-learning adoption in the educational sector because each nation's educational system has a unique set of codes of conduct and regulations.

It has been determined that in order for ICT to be successfully integrated into HEIs, it is necessary to study and combine key components into a locally defined model of technology adoption (Adekunle Thoma et al, 2015). In order to establish a workable model for the implementation of E-learning across universities in the Southwest of Nigeria, there is a tremendous need to analyse the limiting constraints and then look for solutions to ameliorate them. The moderators are important to this research study since it focuses- on the gaps that have been identified.

1.6   Scope of Research

The research covers a critical review on e-learning adoption studies with emphasis in Nigeria. The study's focused population are tertiary institution students. More specifically, the students for this study comprise both undergraduate and postgraduate students. Also, the study was carried out among students from tertiary institutions within South-West Nigeria.

1.7   Research Objectives

The major objective of this research is to empirically identify and investigate the factors affecting student's e-learning adoption in tertiary institutions within South-West Nigeria. It also investigates the moderating effects of instructional environment and learning styles of students on the relationship between their perceptions and e-learning adoption in tertiary institutions. The findings were used to propose an e-learning adoption model for students in tertiary institutions of South-West Nigeria. The following are specific research objectives which guided the study:

- To identify factors affecting students' e-learning adoption in tertiary institutions within South-West Nigeria.

- To investigate the moderating factors of e-learning adoption for students in tertiary institutions within South-West Nigeria.

- To develop an e-learning adoption model for students in tertiary institutions within South-West Nigeria.

1.8   Mapping of Specific Research Objectives & Research Questions

Table 1.1 below presents the mapping between specific research objectives and the respective questions answering each objective for clearer representation of the link.

Table 1.1: Research Objective and Research Questions Mapping

Specific Research Objectives	Research Questions
To identify factors affecting students' e-learning adoption in tertiary institutions	What are the factors affecting students' e-learning adoption in tertiary institutions?
To propose an e-learning adoption model for students in tertiary institutions	What are the constructs for e-learning adoption model in tertiary institutions?
To validate an e-learning adoption model for students in tertiary institutions	What is the representation of the proposed model to real life system?

1.9 Research Significance

This research is significant in the following aspects:

- Contribution to Knowledge: This study shall contribute by giving a clear exploration as to what extent instructional environmental factors and learning styles of students play a role in mediating the factors that affect e-learning adoption within Southwest Nigerian tertiary Institutions.

- Contribution to Practitioners: The participants of the study (students) can be educated about certain e-leaning adoption issues via the survey.

- Contribution to Training: The results from the research could instigate the need for group-focused e-learning adoption training for tertiary institution students within Southwest Nigeria.

1.10 Organization of Thesis

The remaining part of this thesis will be organized accordingly thus:

Chapter Two: This provides critical and comprehensive review of previously related literature. The major purpose of this chapter is the provision of a solid foundation for the research.

Chapter Three: This chapter presents the methods and approaches used in conducting the research, as well as all constructs being used for the proposed model's development are clearly explained step by step.

Chapter Four: This chapter presents the analysis and the results of the analysis. All relevant statistical tests conducted are presented here as well. It also gives a clarified interpretation of the analysis results.

Chapter Five: This chapter is the final chapter of this thesis, and it provides a summary of the results, as well as critically discuss some insight into the results. Also, it gives recommendations from the study and propose future studies.

CHAPTER 2: LITERATURE REVIEW

2.1   Preamble

The major aspects of this dissertation is reviewed critically in this chapter; this includes, the subject of e-learning, benefit of e-learning, e-learning adoption, e-learning adoption in developing countries. Moreover, explanations on e-learning application barriers in developing countries are provided, alongside e-learning adoption and prospects in Nigeria, coupled with impact of cultural and personal differences, and curricular design environmental variables. Theoretical frameworks such as Universal Learning Theory, Technology Acceptance Theory, and Learning Styles Theory, were reviewed. The chapter commences with applying a search approach used in retrieving relevant literature. Moreover, section 2.3 discusses e-learning technology background. Section 2.4 gives an introduction to how Technology Acceptance Model (TAM) is developed, coupled with its branches and parents. Furthermore, section 2.5 discusses emphatically on the Learning Styles Theory and how it can possibly impact experience of learners as well as acceptance of e-learning. Additionally, the section discusses how the Felder and Silverman learning Styles Model (FSLSM) is developed. Section 2.6 gives a critical review on the general conception of Universal Learning Theory, focusing more on the framework for the Universal Design for Learning (UDL), alongside its impact on perception of learners and acceptance of e-learning. To conclude the chapter, section 2.7 summarizes the crucial themes discussed.

2.2   Concept of E-Learning

E-learning represents a new generation of electronic teaching methods. By connecting to the network, teachers and learners can experience interactive learning on the Internet. In addition, the constraints of conventional teaching environments are also solved by e-learning, which is also a new instruction medium, a new tool, and an entirely new learning

environment. (Juinn & Tan, 2013, Lakbala, P. (2016). According to Yakubu and Dansuki (2018), e-Learning is a product of the evolution of the learning process due to the application of ICT in the classroom while e-learning is learning utilizing electronic technologies to access educational curriculum outside of a traditional classroom. In most cases, e-learning is an inclusive terminology that encompasses all forms of educational technology that electronically or technologically support learning and teaching (Sander Tamm, 2023). E-learning is the practice of delivering a wide range of solutions that improve knowledge and performance using Internet technology (Akram & Bushra, 2020). E-Learning combines two main areas; learning and technology (Logan et al., 2021; Nuryadi et al., 2020). It is described as one of the evolving technology patterns using various electronic devices that enhance learners' knowledge, skills, and outcomes (Al-atabi & Al-noori, 2020; Foltynek & Motycka, 2018; Küsel et al., 2020; Marsevani, 2021). Technology-based e-learning encompasses the use of the internet and other important technologies to produce materials for learning, teach learners, and also regulate courses in an institution which provide new directions and new modes of thinking (Tan & Hsu, 2017). Compared to the emergence of the internet, e-learning is a relatively contemporary development. E-learning, which involves using computer technology to carry out routine academic activities, is quickly gaining acceptance in almost every community (Olowonisi, 2016). Ibezim (2013) previously mentioned how e-learning has essentially evolved into one of those instruments that is regularly utilized to improve teaching and learning in the twenty-first century. As a result, all activities involving electronically mediated instruction now fall under the umbrella of e-learning (Kyari, Adiuku-Brown, Abechi, and Adelakun, 2018; Obi, Charles-Okoli, Agunwa, Omotowo, Ndu, and Agwu-Umahi, 2018). Gordon Bubou, & Gabriel Job, (2021) affirmed that e-learning, which involves using computer technology to carry out routine academic activities, is quickly gaining acceptance in almost every community (Olowonisi, 2016). Ibezim (2013)

previously mentioned how e-learning has essentially evolved into one of those instruments that is regularly utilized to improve teaching and learning in the twenty-first century. As a result, all activities involving electronically mediated instruction now fall under the umbrella of e-learning (Kyari, Adiuku-Brown, Abechi, and Adelakun, 2018; Obi, Charles-Okoli, Agunwa, Omotowo, Ndu, and Agwu-Umahi, 2018). It implies the use of other technologies, such as those used to provide instructions, in addition to computers and the Internet, for educational reasons (S. Ghavifekr 2015). Thus, a proper definition can be "it uses the latest technologies to assist and enhance knowledge distribution, and calls for flexible and active interactions amongst online teachers and students" (Elena Verezub, et al, 2023).

2.3   Benefits of E-Learning

According to (Valentina Arkorful, 2021: Valentine Arkorful, Nelly Abaidoo, 2014), given its many advantages and benefits, e-learning is regarded as one of the best delivery systems for education. It is especially beneficial for higher education institutions. For instance, the asynchronous way permits each student to study at his or her own pace and speed whether slow or quick. In other words, e-learning increases satisfaction and decreases stress. The benefits of e-learning to students and instructors are numerous. Overall, E-Learning enhances both the teaching and learning process. It provides quicker access to education curriculum, effective for cost management because it reduces the long-term costs of learning, and through distance learning, it expands educational opportunities to learners in distant locations (Lwoga, 2014). Studies show that e-learning is by far a more effective method of teaching because it increases knowledge of the learner (Lwoga, 2011; Salter, Karia, Sanfilippo, & Clifford, 2014). E-Learning has also been found to motivate students' interaction and ease communication (Arkorful & Abaidoo, 2015). Bhuasiri et al. (2012) observed that e-learning brings about many benefits for both universities and students.

). Since many people who previously couldn't attend school before the revolution now have simple access to educational and training services, internet delivery methods have further altered educational technology and enabled purposeful learning activities (Gordon Bubou, & Gabriel Job, 2021). It is also affirmed that a significant amount of money will be saved with the incorporation of e-learning into the learning and teaching systems of higher education institutions in as well as prospective students, related to the investment in physical teaching and learning infrastructures (Gordon Bubou, & Gabriel Job, 2021). In addition, e-learning is advantageous in a plethora of ways since it accommodates students' varying needs, supports individuals with disabilities, engages students who do not respond well in traditional educational settings, offers opportunities to enhance learning for gifted and talented students, and helps them develop independent learning skills through professional learning experiences (Malale, Gomba & Dichaba, 2018; Meskhi, Ponomareva & Ugnich, 2019According to Lee (2010), universities are one of the major beneficiaries of e-learning, as it helps them integrate further into the global educational environment through strategic alliances. International cooperation and links in the field of teaching can take place beyond the boundaries of one country; for example, exchange programmes where a joint training curriculum is developed for international students are not required to go to a university abroad to study, but are able to receive full academic services provided by the foreign university. E-learning give maximum flexibility, it is not limited by time and space as it can take place at home, at work, or anywhere via computers or mobile devices connected to the Internet and the university's e-learning system (Bhuasiri et al., 2012; Kilburn, Kilburn, & Cates, 2014). This is particularly convenient for students who are learning and working at the same time (Wisloski, 2011). More so, with e-learning, students can completely control the pace and rhythm of their studies as they are not required to attend physical classes on campus (Bhuasiri et al., 2012). Contemporarily, the technology is changing with the pace of which

the world is changing and just like corporates are doing, universities are implementing student caring strategies to improve customer satisfaction (Pham, L., Limbu et al, 2019).

Reportedly, e-learning application significantly influences higher education, as learners enjoy being flexible with choosing their suitable modes of learning, in accordance to commitments or/and individual preferences. Past studies have revealed that implementation of an effective e-learning is an approach in which salient issues linked to achievement and learning are being resolved amicably (Govindasamy, 2002). Thus, based on summary from literature (Ahmed Al-Azawei, Karsten Lundqvist, & Patrick Parslow, 2016: also cited by Kevin P. Brady, Lori Holcomb & Bethany Smith, 2010; Nouf Matar Alzahrani et al., 2020; Ying-Chieh et al., 2012; Benjamin P. Granger et al., 2010), there are several benefits of e-learning:

- Accessibility: With e-learning, it is easier for students to gain accessibility to rich learning content from the comfort of their devices and in the process meet the special needs of the learner(s).

- Adaptivity and adaptability: e-learning can easily incorporate various learning styles, teaching approaches, including content presentation and the learners' learning mode.

- Efficient interaction: given the amount of flexibility that e-learning gives, it can facilitate interactions within and outside of learning hours. It is not limited by space and time.

- Cooperation and collaboration: The dual can be enhanced via utilizing available learning management systems (LMSs) communication tools, including, chat tools, forums, and wikis, alongside grouping learners to achieve work collaboration.

- Teaching and learning in synchronous or asynchronous mode: at every point in time, learners and teachers can choose between an array of suitable approach in transmitting and delivering of content.

- Reducing cost: learners can reduce tuition fees by taking e-learning courses. More so, e-learning can help in avoiding traveling as well as other similar types of expenditure and saves time and effort.

- Promoting teaching quality: e-learning functionalities can be exploited to integrate pedagogical theories and make lessons more interactive.

- Ease of managing and tracking learners' activities: LMSs can provide rich log files that track learners' activities within the system which can be leveraged to make better informed decisions and improve learner experience

- A self-paced learning and learner-centred environment: a face-to-face (F2F) approach is heavily reliant on the tutor. However, this is not effectively applicable for all categories of students, especially if factors such as un-balanced background and inequality in age is considered.

2.4 Concept of E-Learning Adoption in Tertiary Institutions of Developing Counties: Nigerian Perspective

The environment of Higher Learning Institution (HLIs) instruction has transformed as a result of e-learning, occasionally in unanticipated ways. It possible to convey knowledge effectively at any time and any place, regardless of the subject. While simultaneously equipping students with the information technology, knowledge, and abilities necessary to compete in the current global knowledge economy, it opens up a world of learning that is unavailable in most parts of the world (Semlambo, Adam A. Frank Seganti & Bakiri Angalia 2022). E-learning Adoption involves the level of acceptance and use of e-learning systems by users (Naciye & Aykut, 2018). Many studies on e-learning adoption have been carried out in Nigeria and other developing countries.

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Worthy of note, there is a significant reluctance to adopting e-learning in developing countries, especially Nigeria (Marangunic & Granic, 2015, Almaiah, Jalil, & Man, 2016; Damnjanovic, Jednak, & Mijatovic, 2015). E-learning has been adopted by many higher education institutions in many countries in the world but a few Nigerian higher education institutions have embraced e-learning. In developed countries, e-learning is well established due to the huge number of resources that have been invested in the education sector (Yakubu and Dansuki, 2018). In a study by Yakubu and Dasuki (2018), the authors assessed adoption of e-learning among Nigerian university students and proposed a novel version of the Information System (IS) success model. Moreover, the scholars included actual usage as well as behavioural intention to the existing constructs of IS Success model in studying for adoption of e-learning by users. Corroboratively, Cheng (2012) assessed the effectiveness of quality e-learning on the usage and adoption intention, of which instructor quality was integrated into the existing theorized IS success model factors, thus emphasizing the presence of a positive significant effect of instructor quality, service, information, and system on e-learning. Similarly, Jagannathanet al. (2018) adopted the model by including the construct of security to assess the acceptability of adopting internet banking. Furthermore, in order to evaluate the effectiveness of e-learning systems, Rolan D. Freeze et al. (2010) used the Information Systems Success (ISS) model. A research study based on the idea that system quality (SQ) and information quality (IQ) affect how well a system is used and how satisfied users are with it. They confirmed that user happiness and system utilization were significantly positively impacted by both system quality and information quality. This analysis suggests that user happiness had a greater influence on system success than system use. Hsu et al. (2014) extended the model via inclusion of the 'trust' variable from the perspective of e-commerce. Mtebe and Raphael (2018) assessed the factors of importance in learners' satisfaction with the e-learning system at the University of Dares Salaam, Tanzania; this

they did via incorporation of constituents such as perceived usefulness and instructor quality. Consequently, the model has been validated by other scholars who carried out studies on e-Government systems (Abdullah I. Alkraiji, 2020) e-commerce (Zhaoli Zhang, Taihe Cao, Jiangbo Shu & Hai Liu 2020) and a mandatory information system (Heiko Gewald & Corinna Gewald, 2017).

Studies on the impact of e-learning and all related fields have shown similarities and connectedness of most of the constructs. Wang and Chiu (2011) for instance, incorporated communication quality to the other components of the IS success model and established that communication quality, service quality and information quality key to user satisfaction. However, user satisfaction is a major determinant to intention to reuse the e-learning systems for various learning activities. Examples of learning activities here are interactions and getting feedbacks. Al-Harbi (2011) in his research on the factors that influence e-learning by analysing the perceptions and attitudes of Saudi university students. Al-Harbi (2011) in his study combined factors from TAM and TPB to explain significant perception and attitudinal factors related to the acceptance of e-learning. The findings demonstrated that attitudes toward e-learning, subjective norms, perceived behavioural control, as well as e-learning system attributes, were critical determinants of students' behavioural intention to use e-learning. A study by Cheng (2012) used constructs from the technology acceptance model (TAM) by Davis (1989) and the updated Information System Success model by Delone and McLean (2003) to examine the effect of quality antecedents on learners' intention to use an e-learning system. In the study, the author found system quality, information quality and service as significant predictors of user satisfaction. This result differs from Lwoga (2014) who showed that information quality and service quality had no relationship with user satisfaction. According to Alsabawy et al. (2013), IT services are important for e-learning to be successful as they can positively influence perceived usefulness, and user satisfaction. On

the other hand, Sawanget, Newton and Jamieson (2013) argue that even in the absence of a high-quality IT service, a good e-learning support system can compensate for the low technological efficacy. Gupnaet al. (2013) opined that the quality of teaching in an e-learning environment is greatly affected by the quality of the e-learning systems adopted.

2.5 Factors Influencing E-Learning Adoption in Tertiary Institutions of Developing Countries: Nigerian Perspective

Developing countries and economies face several challenges when it comes to e-learning and the challenges range from implementation to adoption. However, a substantial amount of literature already exists which focus on the predictors of e-learning implementation and adoption in tertiary institutions. The challenges, usually captured as resistance can be cultural, financial, organizational, structural, environmental, technological, or personal issues (Al-Azwei, 2016). In the case of African countries, it is usually a combination of the factors above. Literatures also exist with recommendations on how to manage the challenges around the adoption and implementation and the most pragmatic one is identification of factors that potentially hinders a successful application of e-learning in Nigeria and enact steps tailored at making sure users adopt the e-learning technology to achieve its key aims.

Developing countries, such as Nigeria, are still at an early stage (Opokuet, Adu & Koi-Akrofi, 2016). This position is maintained by the researchers because of the perculiar challenges that tertiary education institutions face in Nigeria. Most of these challenges have political, economic or socio-cultural undertones. For example, inadequate infrastructure, lack of funding, overcrowded classrooms and the dearth of instructors are some of the challenges faced by educational institutions in Nigeria, and these have political undertones. These challenges have limited the growth and/or adoption of e-learning in Nigeria (Boyi, 2014). Meanwhile lack of funding has been identified as the major challenge that hinders the purchase of e-learning technologies as well as

implementation of e-learning in Nigerian universities. The shortfall of this results in negative effects in the training required by both instructors and technical support needed for effective delivery. In a study conducted by Mtebe and Raisamo (2014), one of the most prominent limitation in the adoption of e-learning in sub-Saharan Africa is cost of acquiring, managing, and maintaining ICT infrastructure.

In the same study, it was established that costs incurred on technology can be significantly reduced by implementing cloud versions of the eLearning applications. However, even if the infrastructure was provided, the bigger challenge will be how students and instructors will access the e-learning platforms hosted in the cloud. This is so because the cost of internet in sub-Saharan Africa is pretty high given that they will bear these costs, despite low quality of internet bandwidth. Salloum and Shaalan (2019) reported that developing countries have failed, fully or partially, to implement e-learning systems effectively. In Opoku et al. (2016), when put head-to-head with their counterparts in the developed world, many countries in West Africa don't measure up in terms of knowledge regarding the acquisition., implementation, adoption, usage, of e-learning. Unfortunately, many higher educational institutions in sub-Saharan Africa are not yet ready to accept the technology (Khasawneh, 2015). As identified earlier, institutions that have adopted e-learning technologies are faced with several challenges including high infrastructure maintenance costs, other infrastructure constraints, outdated information access points and poor internet connectivity in terms of bandwidth, which have been reported to be among the factors responsible for low-level adoption of e-learning in developing countries (Shraim and Khlaif, 2010).

Worthy of note, Volungeviciene, A., Tereseviĉienė, M. & Tait, A. (2014) carried out a review on TEL integration in several developing countries, thus proposing a potentially enabling study for the improvement of e-learning initiatives on the educational sector globally. Nevertheless, the absence of ICT infrastructure (technical) as well as poverty

(financial), are the major challenges delaying the incorporation of e-learning to those areas. As informed duly by Zamani and Esfijani (2016), there are certain stumbling blocks posed at developed nations as regarding the usage of e-learning, they can be grouped as thus:

- Personal challenges; which the author opines comprises factors linked to habitual behaviour and characteristics (internal personal features).

- Attitudinal inhibitors; which encompasses internal variables that are more relevant to the person's perspectives of features of e-learning.

- Contextual inhibitors; which relates to external variables, such as lack of requisite skills in ICT and/or absence of organisational support, in this case, university ecosystem support.

In summary, factors influencing e-learning application in Nigeria do not differ in broad perspectives from those encountered in other developing nations of the world. Studies in Nigeria reveal that there are multiple factors influencing e-learning adoption in Nigerian tertiary institutions. These include environmental factors such as technological, instructional, administrative and infrastructural variables, as well as cultural and individual differences (particularly learning styles) (Almaiah, Al-Khasawneh & Althunibat, 2020; Anene, et al., 2014; Yakubu & Salihu, 2019; Ramzani and Suleiman, 2019; Oye, Mazleena & Lahad, 2011). Al-Adwan and Smedley (2012) in their submission, stated that culture plays a significant role in preventing effective e-learning application. Therefore, they suggested the need to conduct workshops and programs on systematic training which are targeted at reducing the factor's effectiveness. In addition, studies have identified social and cultural obstacles as strong influencers on the adoption of technology. However, educational institutions can address technical issues effectiveness via reliable socio-cultural support, as cultural and social barriers are seemingly more challenging to surmount. Elzawi and Wade (2012) opine that the both

aforementioned factors hinder the application of e-learning. The research of Marinne A. Azer and Ahmed M. El-Sherbini (2011), which argued that users of e-learning frequently overlook cultural considerations and insights that employees or customers have in influencing how they learn and the learning process as a whole, supports this opinion. Customers of e-learning, such as buyers, teachers, students, and end users, are specifically expected to work with curriculum created in and for a different culture. They listed a number of factors that could generate or exacerbate these cultural disparities:

i. The environment into which ICTs are introduced

ii. The types of technology used

iii. The content, philosophy and format of educational ICTs

iv. The characteristics of the learners themselves

- The environments into which ICTs are introduced

- The types of technology used

- The content, philosophy and format of educational

- The characteristics of the learners themselves

Peculiar to emerging economies is the lack of requisite ICT skills. This has been identified as another major hindrance to the implementation of e-learning. Closely tied to lack of skills is self-confidence. Thus, users who are unskilled are liable to go through challenges with implementation and management of technology, which will in return yield a low adoption. Touray, A., Salminen, A. and Mursu, A. (2013) submitted that ease of technology use as well as self-efficacy are major ICT barriers and critical success factors in developing countries influencing e-learning adoption. According to M. Feidakis (2016), students' lack of self-confidence, low motivation and engagement, self-regulation and task performance in e-learning systems are all listed as the major barriers averting its effective uptake in developing countries. In addition to the above, the unavailability of

basic infrastructure such as power supply, conducive atmosphere and reliable internet etc., for the needed technology is likely to pose a hindrance to the implementation of e-learning. Thus, nations with such disadvantage may probably face serious challenges in ensuring a successful e-learning adoption. As reported from previous literature, poor ICTs infrastructure is a major barrier for the implementation of e-learning (Kisanga, D. & Ireson, G. 2015; Matar et al., 2010).

Based on this discussion, this study focused on finding out the moderating effects environmental and learning styles (individual differences) on e-learning adoption in tertiary institutions in Southwest Nigeria, as they have been observed to be some of the most causes of low adoption of e-learning in Nigerian institutions.

2.5.1   The Impact of Learning Styles on E-learning Adoption and Learners' Experience

The introduction of e-learning has triggered the need to adapt learning styles to it. This has been achieved so far by either adapting the output of e-learning to the individual learner's preference (Akbulut & Cardak, 2012; Truong, 2015), or understudying its link with the belief of learners as well as their attitude as concerns the respective technology (Huang, 2015; Li, 2015). E-learning technology has proven to be very flexible with diverse learning styles. That is why there has been an extensive application on the styles of learning in e-learning research. An instance is the visually-oriented students, who prefer graphs, pictorial materials, as well as videos, and might find e-learning suitable with their regular style of learning. Huang (2015) opines that due to the flexibility that e-learning technology offers, global learners, who like to stay in control of their learning pace and outcome will favour the technology of e-learning. Nevertheless, a couple of previous meta-analyses that reviewed e-learning style of learning, suggested that there is a gap regarding empirical research conducted on how effective this psychological trait could be (Truong, 2015). Recent studies reviewed the connection between behavioural

intention and perception of learners and their styles of learning on e-learning. The outcomes are categorized into three, in accordance to adopted techniques of statistical analysis in such studies.

- The first comprises investigative research on the differences in the perception and attitude of learners based on several learning styles.

- The second category includes studies that tested about 26 moderating learning style effects.

- Finally, the third aspect comprises scholarly works that extended the acceptance theories of e-learning via the inclusion of predictive learning styles.

Referring to the first category, several studies have employed one-way ANOVA or t-test approach in assessing differences between groups. One of these scenarios is in the study of Federico (2000), who investigated learners' attitude difference to network-based instructions, in accordance to Kolb's model. The analysis suggested that learners who preferred accommodating and assimilation accepted more as compared to the other investigated groups. Corroboratively, Young, Klemz and Murphy (2003) adopted Kolb's model in examining learners' attitudinal differences on five education-based technologies (laptop computers, email, blackboard LMS, access to the Internet, and PowerPoint presentations). From their results, there were no significant differences found among the groups. Moreover, Chen (2011) conducted a study on relationship existing between attitude of learners and their style of learning, to the educational usage of Facebook, based on Kolb's model. Findings revealed that the 'converger' group was significantly attitudinal to the technology of Facebook, however, there was no significant differences among the remaining dimensions. Consequently, Li (2015), investigated the acceptance of interactive learning technology (wikis) in accordance to the Felder and Silverman model. From this study, there was a significant difference found only among reflective and active learners, whereas learners that were active had higher likelihood of accepting

wikis as compared to their reflective peers. Moreover, Balakrishnan and Gan (2016) studied the intention of learners in using social media educatively, on the basis of three learning style types, namely: participatory, independent and collaborative. Here, there was significant different found among the collaborative and participatory styles.

From the second category of literature, a multigroup analysis was carried out to comprehend the learning styles moderating effects. Huang (2015) assessed the impact of Felder and Silverman model global/sequential dimension on the intention of learners to use collaborative learning technology (Prezi). From the findings, it was revealed that students who preferred sequential learning are probably concerned more with the technology usefulness, whereas students with a global learning orientation were more concerned with the needed effort to utilize it. Authors such as Ramirez-Correa, Javier Rondan-Cataluña, Arenas-Gaitán and Alfaro-Perez (2017) also adopted the Felder and Silverman model in assessing learning styles moderating effect on the success of e-learning. The strength path among the several variables in the applied research model was affected subsequently by the dimensions of the learning style. Corroboratively, Ursavaş and Reisoglu (2017) discovered that Witkin's cognitive styles model 27 field independence/dependence, demonstrated a moderating impact on the path strength of numerous constituents in an extended TAM.

Moreover, the third category of literature is related to approaches like the Pearson's correlation coefficient, linear regression and structural equation modelling, used in examining the link between learners' attitude and style of learning, behavioural and perceptual intentions. Afzaal H. Seyal and Mohd Noah A. Rahman (2015) highlighted the relationship between learners' attitudes and their learning styles with reference to the use of ICT in education by utilizing the Honey and Mumford model thus concluded that the proper attitude toward accepting the new learning method is developed by a number of organizational, environmental, technological, and personal elements. Students'

attitudes toward e-learning are influenced by a variety of factors, including their level of confidence, patience, and self-discipline, as well as the software's usability, peer support, technical proficiency, and time management skills. Learners are both emotionally and intellectually complex, and emotions affect how they perceive the world and the things they choose to accomplish learning situations."
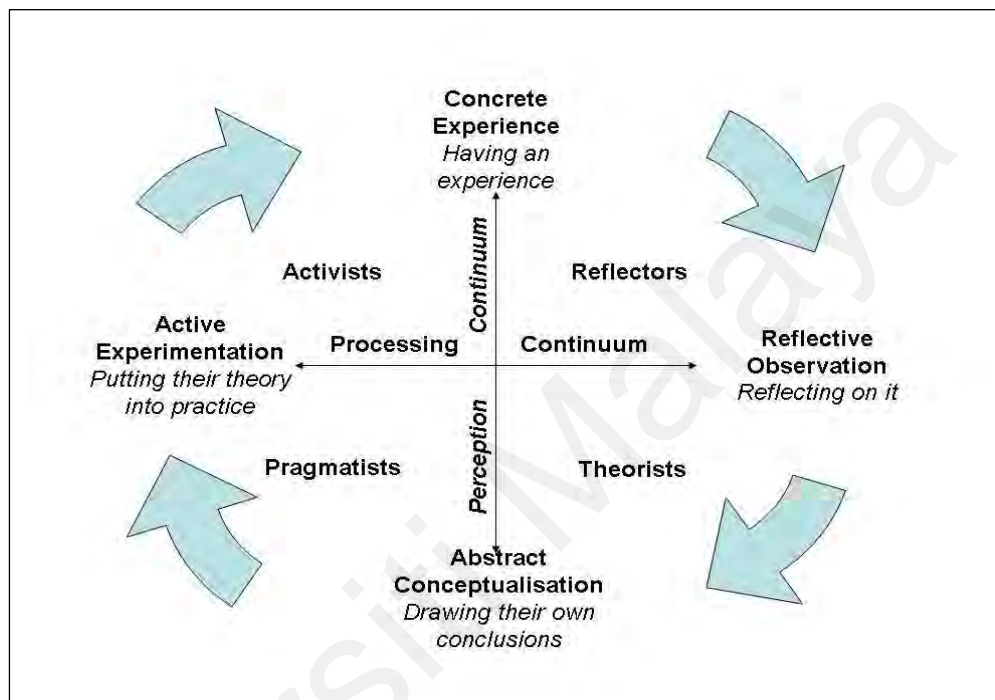
Figure 2.1.: Honey and Mumford's Learning Cycle linked with learning styles – Honey, P. & Mumford, A. (1995). Using your learning styles. Maidenhead: Peter Honey Publications Ltd.p. 17 (ref: Gavin Beever, 2017)

Figure 2.1 above shows the recommendation of Peter Honey and Alan Mumford's model depicting the fact that, "to maximise personal learning, each learner ought to understand their own learning style and seek out opportunities to learn in their learning style. But they should also develop their learning capacity in other styles to become a better-rounded learner with a conclusion that it will increases absolutely versatility in learning situation (Gavin Beever, 2017)". In furtherance, Gavin Beever explains those element in the figure 2.1 above, to prove the relationship between learners' attitudes and their learning styles with reference to the use of ICT in education by utilizing the Honey and Mumford model:

i. **The Activist - Hands-on:** This category responds to learning through mistakes. Activists relish the present moment and are content to let it rule their lives. They tend to be excited about everything new since they are open-minded and not sceptical. They use brainstorming to attack difficulties. They start hunting for the next action as soon as the first excitement has subsided. They typically enjoy the challenge of trying new things, but find implementation and long-term consolidation boring (Gavin Beevre, 2017).

ii. **The Theorist – convince me:** Responds to learning through clarity of argument. In order to create intricate yet logically valid ideas, theorists modify and incorporate observations. Theorists approach problems logically and vertically, step by step. They combine various facts into comprehensible theories. They have a tendency to be perfectionists who won't feel comfortable sleeping unless everything is organized and makes sense. They enjoy analysing and synthesising (Gavin Beevre, 2017).

iii. **The Pragmatist – show me:** They like an expert to demonstrate through application. Pragmatists are eager to test out concepts, theories, and methods to discover how well they function in actual situations. Pragmatists actively seek out novel concepts and seize every chance to try out potential applications. They are the kind of individuals who come away from courses bursting with fresh concepts that they want to put into action. They prefer to move rapidly and confidently forward with ideas that interest them. They frequently grow impatient with brooding and lengthy conversations (Gavin Beevre, 2017).

iv. **The Reflector – tell me:** Like to be briefed before they are willing to take action. Reflectors like to stand back to ponder experiences and observe them from many different perspectives. Reflectors gather information—both their

own and that of others—and prefer to give it careful thought before making a decision. They tend to delay coming to firm conclusions as long as possible because they believe that the careful collecting and analysis of evidence concerning experiences and events is what matters. Their guiding principle is caution, and they are thoughtful individuals who want to weigh all available factors and ramifications before acting. Reflectors like observing others in action and prefer to take a backseat in meetings and discussions (Gavin Beevre, 2017).

Results from the Pearson's correlation test revealed that there was a negative and significantly weak relationship found among the context dimensions, theorist style and interactivity. Consequently, I. J. Prithishkumar and S A Michael (2014), established that the VARK model significant determined the satisfaction of learners. Nevertheless, Diana Zagulova et al., (2019), utilised the Felder and Silverman model popularly known as *Index of Learning Style Questionnaire (ILSQ) designed in 1988*, with a purpose to capture the learning style differences among students, and to provide a good foundation for instructors to design a teaching approach that would address the learning needs of all students. This model according to (Diana Zangulova et al., 2019) denotes four areas of personality that contribute to learning. The model creates four dimensions (types of learners) of learning styles. They are active or reflective, sensing or intuitive, visual or verbal, and sequential or global. A combination of these styles makes up the individual's learning preferences. Diana Zangulova et al., 2019) concluded that, the Felder-Silverman study is focused on the hypothesis that students who have strongly preferred a particular learning style may experience significant difficulties during the learning process if the teaching style does not correspond with their preferred learning style or cannot be fully incorporated into an educational setting. This shows the differences in Honey and Mum ford's

Model to that Felder's Model. Therefore, the regression analysis technique that was applied in their research revealed the weak predictability of learning styles for online learning.

Moreover, Huang, Lin and Huang (2012) adopted the Felder and Silverman model to directly predict e-learning online participative behaviour. However, based on structured equation modelling, sensing/intuitive dimension was revealed as the only predictor. Contrarywise, Gu, Triche, Thompson and Cao (2012) assumed the predictability of the VARK model on TAM's perceived usefulness and perceived ease of use. Summarily, both assumptions are supported by the findings. Corroboratively, Toni and Holtbru (2012) utilised the Kolb's model in ascertaining its determining ability of perceived usefulness. From the findings, it was asserted that learning styles have the capability of explaining the construct's acceptable variance fit. Nonetheless, the Felder and Silverman model was unable to predict mobile learning game perceived enjoyment (Baek & Touati, 2016).

2.6   Theoretical Framework

This section discusses the theoretical framework on which this research model is based on. The theoretical foundations are based on three major theories which are widely used in behavioural studies as well as in e-learning adoption studies. The theories are Technology Acceptance Model (TAM), Learning Styles Theory (LST) and Universal Design for Learning Framework (UDL). Thus, these theories form the foundation for the proposed model in this study.

2.6.1   Technology Acceptance Model (TAM): Development

Walldén, Mäkinen & Raisamo (2015) defined user acceptance as "an obvious inclination to accept a specific technology for the activities it is developed". Contrarily, failure in technology can be referred to as "shortfall between actual and required

performance" (Dwivedi et al., 2014). The subject of e-learning has spiked a lot of interest in this research field. One common reason for this interest is the high rate of failure as regards the implementation and adoption of e-learning. A significant amount of work has been invested towards the identification of important factors that has impact on its acceptability. More so, studies on the failure or success of e-learning are based on research in the area of information systems (ISs), which identifies crucial e-learning success antecedents (Gordon Bobou and Gabriel Job, 2017 pp. 9 -14).

The current research is foundationally based on TAM (Campbell, J. I. et al., 2017: Mohd Shafie Rosli et al., 2022: Lai, P. 2017). TAM is a well-known and vast-cited model, and boasts to be among the most influential theories in IS research (Hwang, Al-Arabiat & Shin, 2015). Furthermore, TAM has been justified economically, theoretically, and empirically (Opoku, M.O. and F. Enu-Kwesi, (2019: Rothaemel, 2012: Hitt, Wu, & Zhou, 2012). In their review the affirmed that **"Technology Acceptance Model (TAM)"** is one of the models that have been used extensively in information management research, which was proposed by Davis (1989) to explain the factors that influence the acceptance and use of technology. The model argues that technology usage is influenced by users' attitude which is also influenced by perceived usefulness and perceived ease of use. The perceived usefulness and perceived ease of use are further influenced by other external factors. Since its introduction, TAM has been reviewed, extended, criticized and examined by many studies in relation to its internal and external consistency.

From the narrative above, many literatures agreed that TAM is a model proposed to explain the acceptability of ISs. Thus, TAM's major constituents were inspired by the Theory of Planned Behaviour (TPB) (Rothaemel, 2012) and the Theory of Reasoned Action (TRA) (Opoku, M.O. and F. Enu-Kwesi, (2019: Hitt, Wu, & Zhou, 2012). A number of limitations have been discussed in TAM and its extensions over the years. In earlier studies, it was criticized that TAM was too simple and that the antecedents of

technology acceptance (perceived usefulness and perceived ease of use) were not understood. The criticisms of TAM research focus on its methodological flaws, some restrictions in the theory's applicability, and the attention that was paid to certain aspects of system utilization at the expense of other crucial factors and connections (Marikyan D. & Papagiannidis, S., 2022: Venkatesh, Thong & Xu, 2012). The contributions of the theory, however, cannot be overshadowed by the limits. For almost three decades, TAM has been demonstrated to be conceptually robust and to have a significant predictive power to gauge people's intention to use. TAM was the first theory to explain why people use information systems, which was crucial for IS research and practice at the time (Marikyan D. & Papagiannidis, S., 2022).

Thence, the aforementioned theories can be considered as founding pillars of TAM. Consequently, TRA focuses on the field of social psychology. It is suggestive of the fact that actions of individuals should be goal-directed, alongside the implications of certain actions considered prior to their performance. More so, it is reliant on the intention of behaviour, which is a vital behaviour predictor that suggests attitudinal behaviour and subjective norms connote the major predictors of behavioural intention. The former refers to the negative or positive assessment of individuals regarding the enacted behaviour, whereas the latter is able to identify social pressure exerted on the decision of a person to either act or not act as a response to the respective behaviour. Moreover, prominent beliefs, like perceived usefulness are proposed to directly predict attitudes towards behaviour. Thus, perceived usefulness denotes the perception of a person as to if an explicit behaviour will result to either a negative or positive outcome.

Among the major disadvantage of TRA, is that its inability to consider persons who have limited control on their behaviour, or at least have the feeling of loss of control. Corroboratively, (Marikyan, Davit & Papagiannidis, Savvas. 2022: Ajzen 2011) proposes the addition of an extra variable (perceived behavioural control) to fix this drawback.

Perceived behavioural control defines users' perceptions of either the difficulty or easiness of the performance of behavioural interest (Marikyan, Davit & Papagiannidis, Savvas. 2022: Ajzen 201--1). Nonetheless, such modification resulted into an additional theory, namely the TPB. Figure 2.2, gives an illustration of the major factors and relationships in both theories.
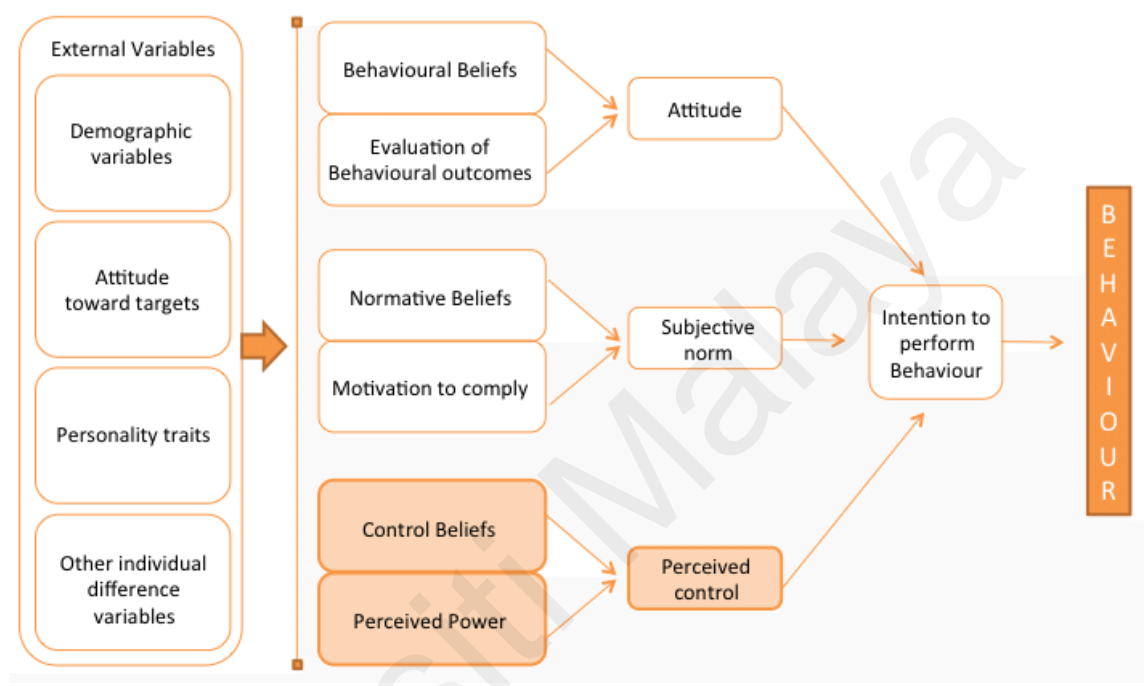
Figure 2.2: Theory of Reasoned Action and Theory of Planned Behaviour. The unshaded boxes show the TRA, the entire figure shows the TPB (extracted from Glanz, et al. 2015: Claire Van Wyk, 2017).

Based on its parent theories, TAM represents an attitude towards behaviour, perceived usefulness and behavioural intention. However, the model suggests excluding the subjective norm, due to the uncertainty of the theoretical base and influence of this factor. This thus made different scholars to test the models of technology acceptance in different contexts and explored the acceptance of different technologies, such as mobile banking, telecommunication technology, virtual reality, e-learning systems, to name a few (Marikyan D. & Papagiannidis, S., 2022: Al-Gahtani, 2016).

Additionally, it incorporates a variable called perceived ease of use, presuming a causal relationship between perceived ease of use, perceived usefulness, attitude toward use, and

intention to use (Marikyan D. & Papagiannidis, S., 2022: Al-Gahtani, 2016). Unlike its parents, TAM proposes a direct relationship between perceived usefulness and intention to use. The theoretical justification for this change is that users may not like a certain technology, but will continue to use it because of its positive impact on their job performance (Marikyan D. & Papagiannidis, S., 2022). The main relationships hypothesised in TAM are that: perceived ease of use is a direct determinant of perceived usefulness and attitude towards use, perceived usefulness has a direct impact on attitude towards use and intention to use, and that attitude towards use has a direct effect on intention to use (Davis, 1986). Figure 2.3 depicts the main factors in TAM and the proposed relationships between them.
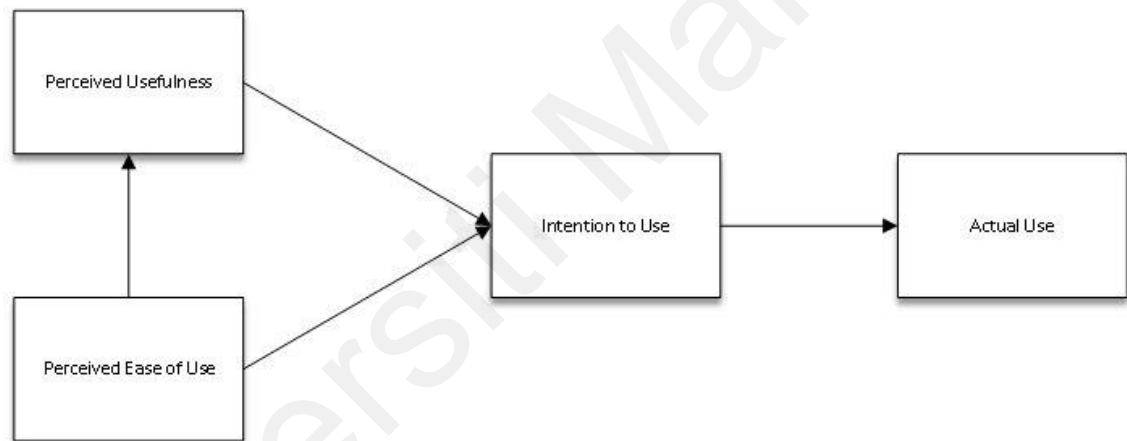
Figure 2.3: Technology Acceptance Model (TAM) (Marikyan D. & Papagiannidis, S., 2022).

Widespread use of TAM has nevertheless given rise to numerous criticisms: (1) TAM ignores the influence of individual and cultural differences on technology usage (Marikyan D. & Papagiannidis, S., 2022), (2) Although TAM can explain 30-40% of behavioural intention, no obvious reasons are provided for the remaining unexplained 60% of variance (Marikyan D. & Papagiannidis, S., 2022), (3) Despite the fact that perceived usefulness and perceived ease of use can explain behavioural intention, TAM theory overlooks what might actually lead to perceived usefulness and perceived ease of

use (Marikyan D. & Papagiannidis, S., 2022) and (4) The explanatory power of TAM has been questioned (Tarhini, 2013). Such criticisms have led to other theories being proposed on the basis of this model. The Technology Acceptance Model 2 (TAM2) suggests that attitude towards use is a weak mediator between perceived usefulness, perceived ease of use and behavioural intention (Marikyan D. & Papagiannidis, S., 2022), so it was excluded. Furthermore, two types of factors, namely (1) Social influence processing, and (2) Cognitive instrumental processing have been added. TAM2 aims to identify the predictors of perceived usefulness and understand the moderating effect of experience and voluntariness on the relationship between the subjective norm and behavioural intention. Figure 2.4 illustrates this theory.
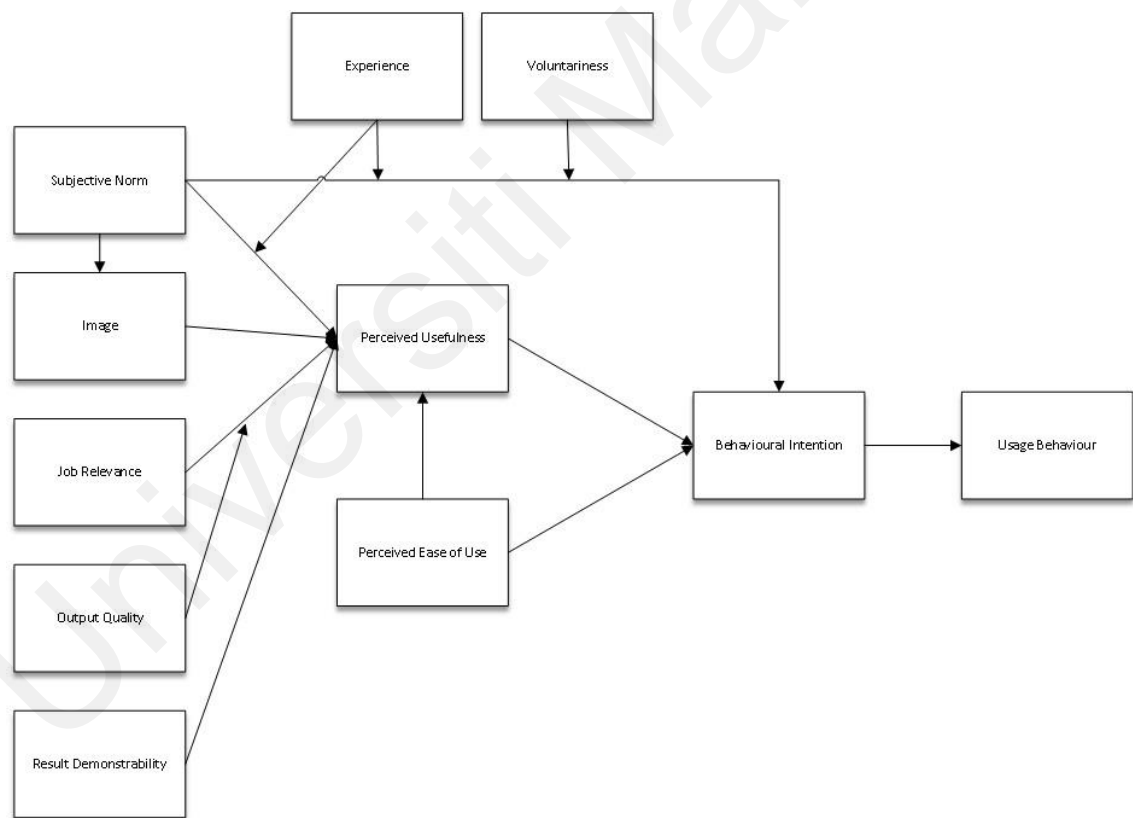
Figure 2. 4: Revised Technology Acceptance Model (TAM2) (Davit M. & Savvas P., 2022)

In the Unified Theory of Acceptance and Use of Technology (UTAUT), proposes that performance expectancy, effort expectancy, and social influence predict behavioural

intention towards the acceptance of information technology (Ayankunle A. Taiwo and Alan G. Downe, 2013). Facilitating conditions refer to the support received by individuals from their organisations to facilitate technology use. UTAUT also considers the moderating effect of individual differences (gender, age, experience and voluntariness) on the relationship between the independent variables and behavioural intention. The original UTAUT framework was developed to explain and predict the acceptance of technology in an organisational context (Marikyan D. & Papagiannidis, S., 2022), although, later it was tested in non-organisational settings too (Venkatesh, Thong & Xu, 2012; Venkatesh, Thong & Xu, 2016). Over the years, UTAUT showed wide application, which enhanced the generalizability of the theory (Venkatesh, Thong & Xu, 2012; Neufeld). Given the variance of information communication technologies and the advances in the sector, a number of scholars extended UTAUT to adapt it to the context or improve its predictive power (Venkatesh, Thong & Xu, 2012). Figure 2.5 shows the main constructs and relationships of this model.
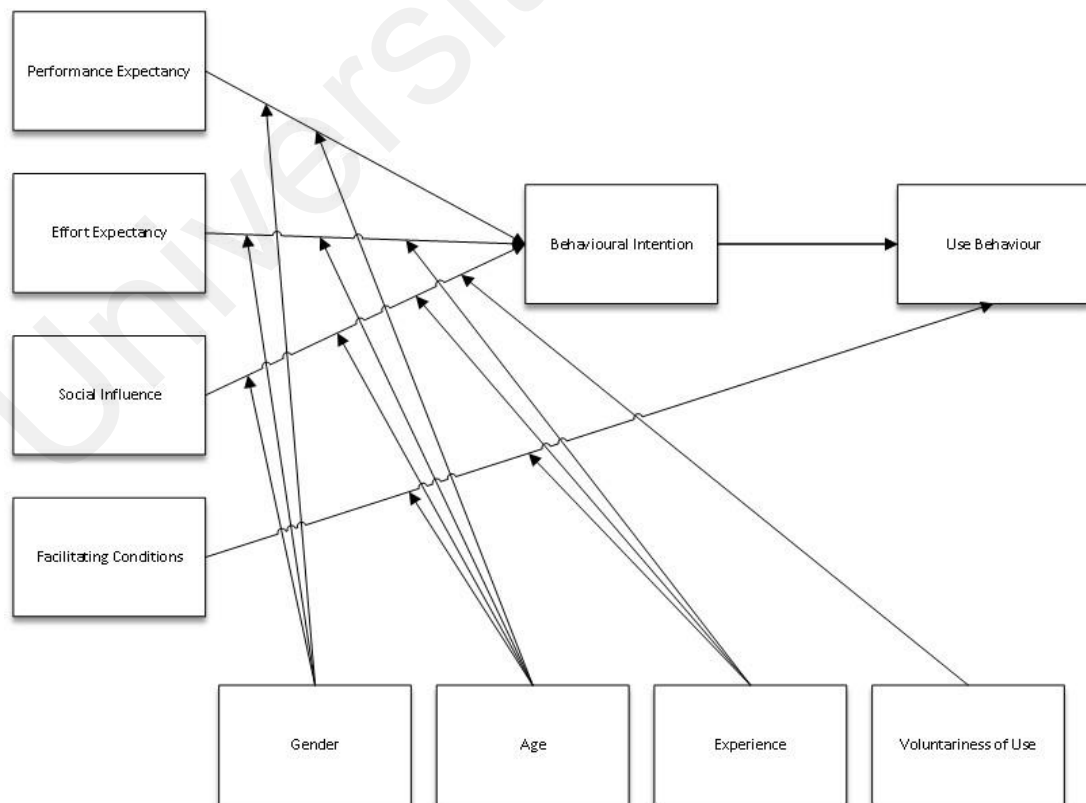
Figure 2.5: Unified Theory of Acceptance and Use of Technology (UTAUT) (Davit M. & Savvas P., 2022)

The Technology Acceptance Model 3 (TAM3) manifests the continuous enhancement of TAM. (Marikyan D. & Papagiannidis, S., 2022), reviewed prior research on TAM, proposing a more comprehensive framework that attempts to identify the main predictors of perceived ease of use and perceived usefulness, rather than behavioural intention. This model combines TAM and UTAUT, but proposes further predictors of perceived ease of use. It moreover hypothesises that individual differences can moderate the relationship between different variables and perceived ease of use, whereas users' beliefs about computer use (self-efficacy, anxiety, enjoyment, control and playfulness) and computers (objective usability) are determinants of perceived ease of use. (Marikyan D. & Papagiannidis, S., 2022), classify these variables into three groups: "control beliefs, intrinsic motivation, and emotion" (p.281). Figure 2.6 depicts the model and the links between its constructs.

When it came to describing the usage of information systems or use intention, TAM3 proved to be reliable. Between 40% and 53% of the variance in behavioural intention and about 36% of the variance in use were explained by the model (Marikyan D. & Papagiannidis, S., 2022). Similar to TAM2, which explained 37%–52% of the variance in usage intention, the explanatory power was strong (Marikyan D. & Papagiannidis, S., 2022). The construction of the behavioral model of the antecedents of both the perception components, however, is the extension's key point of strength (perceived ease of use and perceived usefulness). This offers a comprehensive list of circumstances and potential outcomes that increase the likelihood that technology will be accepted. TAM3 provides a thorough list of interventions with immediate implications for decision-making with regard to IT adoption and management by outlining the connections between antecedents, perceived ease of use, and perceived usefulness (Marikyan D. & Papagiannidis, S., 2022).
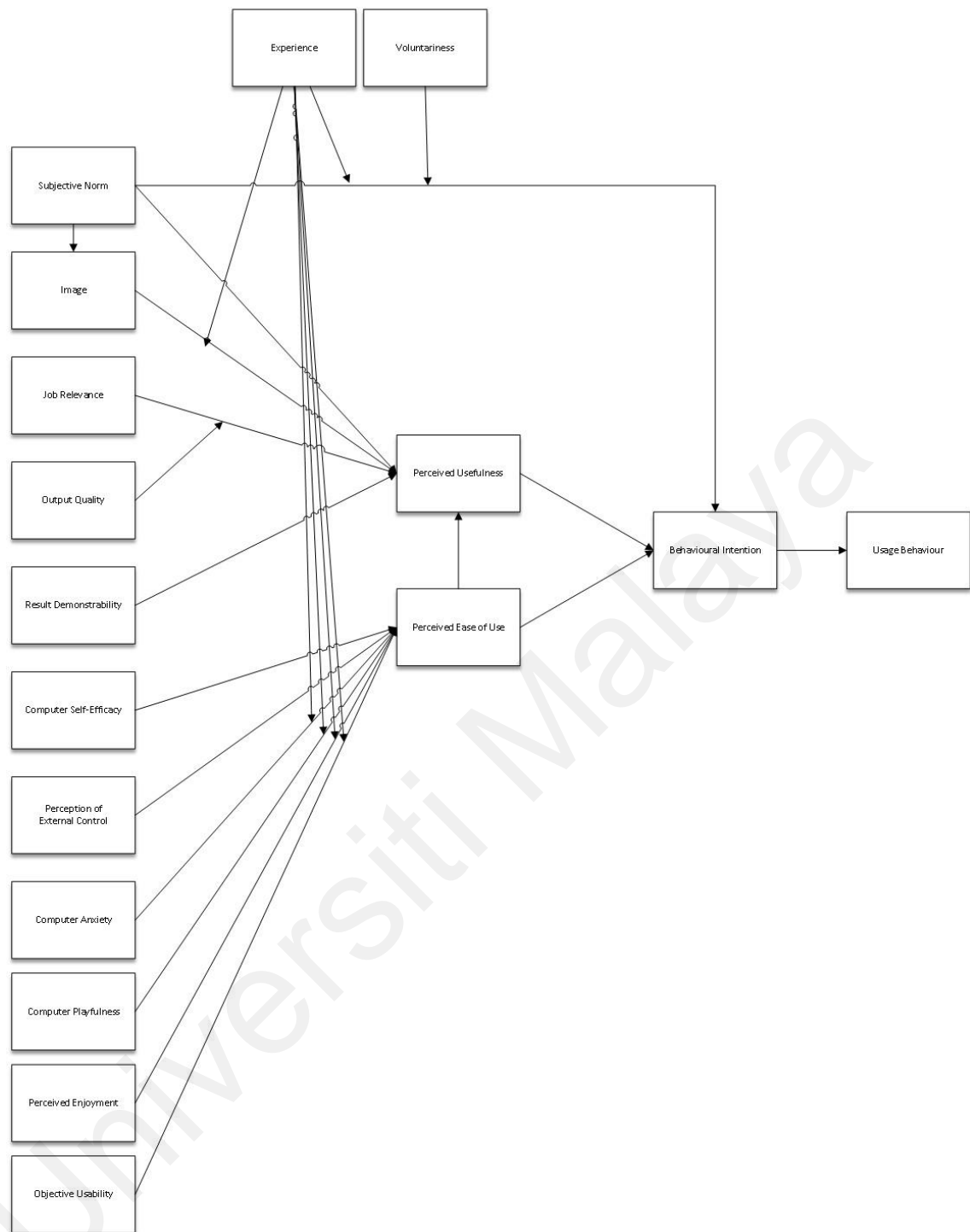
Figure 2.6: Technology Acceptance Model 3 (TAM3) (Marikyan D. & Papagiannidis, S., 2022).

Nevertheless, in an e-learning context, the explanatory power of TAM branches (TAM2, UTAUT and TAM3) has not been found to be significantly higher than in the original model. Baker, Al-Gahtani and Hubona (2010) adopted TAM2 to examine users'

willingness to accept computers in Saudi Arabia. The model consequently explained 40.3% of the variance of behavioural intention. Meanwhile, Mtebe, Mbwilo and Kissaka (2016) investigated the acceptance of multimedia instructions in Tanzania, based on UTAUT, whereby the model successfully explained 40.2% of the variance of behavioural intention. Similarly, Al-Gahtani (2016) used TAM3 to assess e-learning acceptance in Saudi Arabia. The collected data led to a prediction of 42% of the variance of behavioural intention towards this technology.

2.6.2   Limitations of TAM

TAM has its limitations. But the interesting thing here is that the theories under study have each sought to address the weaknesses in their predecessor. For example, TRA fails to take into account those behaviours that cannot be completely controlled, whereas TPB attempts to overcome this limitation. Both consider the subjective norm to be an influential factor in behavioural intention. They also propose attitude towards use as a mediator between perceived usefulness and behavioural intention. In contrast, TAM excludes the subjective norm and brings about significant change in TRA and TPB by suggesting that the expectation of enhanced job performance (perceived usefulness) is a direct predictor of behavioural intention (Al-Azwei, 2016).

In the models based on TAM, the majority of the effort has been invested in explaining perceived usefulness and perceived ease of use. However, it has also been found that even with such extension, the overall power of the models is similar to, or slightly higher than the typical explanatory power of TAM. Furthermore, the parsimony and ease of evaluation inherent in TAM can provide further support for this model, which could explain why Šumak, Heričko and Pušnik (2011) found that 86% of the literature on e-learning acceptance exhibited the adoption of TAM. Also, TAM 3 fails to consider the

influence of environmental variables, cultural and individual differences (learning styles) on user's technology adoption (Al-Azwei, 2016; Marangunic & Granic, 2015).

2.6.3 Felder and Silverman Learning Styles Theory

Learning styles are defined as "characteristic strengths and preferences in the ways they [learners] take in and process information" (Felder, 1996, p.18). In 2002, modifying the work his partner and himself did, Felder excluded the inductive/deductive dimension based on the notion that the traditional teaching method in higher education Engineering disciplines is more or less deductive. In the same review, he substituted the visual/auditory dimension with visual/verbal dimension, based on the premise that the auditory aspect refers to spoken words or other sounds, but does not include the written word (Felder, 2002). From a psychological perspective, the term 'verbal' can refer to both the spoken and written word, due to the human tendency to translate the written word into its equivalent sounds (Felder, 2002). In summary, his reviewed work can be described thus;

- **Processing (active/reflective):** this describes how learners process information – active or reflective. Active learners prefer immediate participation in learning and learn better in groups, interacting with their environment through self-assessment. Moreover, they are more likely to enjoy experimentation, whereas reflective learners adopt an analytical approach and prefer to study alone or with a familiar partner. Here, the learner makes the decisions regarding how they learn.

- **Perception (sensing/intuitive):** 'sensing' learners prefer facts and have the capacity to memorise information with ease. They also tend to follow tutors' approaches when solving problems; patiently and carefully attending to simple details, while working slowly and methodically. In contrast, intuitive learners are more comfortable with theories and tend to apply innovative approaches to

problem-solving. However, they are disinterested in detail, but gravitate more towards complicated issues, grasping concepts quickly.

- **Input (visual/verbal):** visual learners learn better and faster with visuals (pictures, images, videos, graphs, demonstrations, charts, animations etc.). On the other hand, verbal learners favour written texts or listening to verbal explanations.

- **Understanding (sequential/global):** the sequential learner is the step-by-step learner who prefers his/her information sequentially (in simple steps) or globally, by viewing the overall picture, before focusing on surface-level details. The sequential learners tend to learn in a series of steps, without looking at the whole picture. They are concerned with partial or shallow materials, but do not extrapolate from these. In most cases, rather than being shallow, they tend to be the ones that pay attention to details. Global learners on the other hand, prefer to make conceptual leaps to avoid working with incomplete or shallow materials and 'think outside the box' to group different ideas together.

- In order to ascertain learning styles based on this model, the Index of Learning Styles (ILS) questionnaire was proposed (Felder & Soloman n.d). Figure 2.7 depicts this model and the scoring scheme (1-11), identifying the learning styles for each dimension.
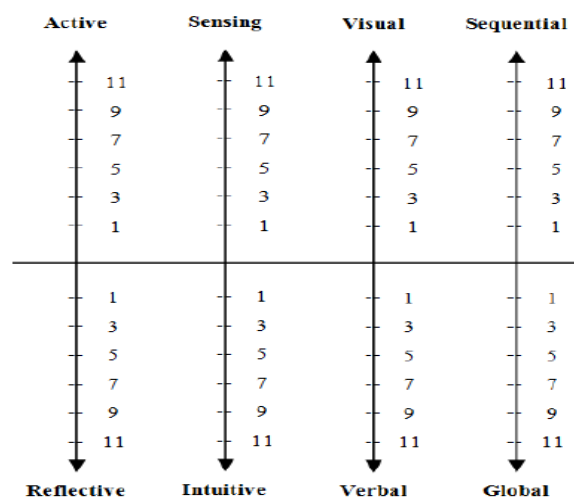
Figure 2.7: FSLSM and Scoring in its Instrument (Ahmed AL-zawei and Karsten Lundqvist, 2015)

The four dimensions of FSLSM also overlap other theories of learning styles. The table below summarises the similarities of these theories/models;

FSLSM	Other Identical Models
FSLSM's active/reflective dimension	Honey and Mumford's activist/reflector model
FSLSM's sensing/intuitive dimension	Kolb's Framework on concrete/abstract dimension (Filippidis & Tsoukalas, 2009) Honey and Mumford's pragmatist/theorist
FSLSM's sequential/global dimension	Pask's holistic/serialist model Witkin's field dependence or field independence model
FSLSM's visual/verbal dimension	VARK model Dunn and Dunn's visual/auditory model

From the similarities stated above, it can be safe to note that these models just differ in name but are mostly the same thing in the ideal sense.

2.6.4 Critiques of Learning Styles

Although learning style theories have attracted significant attention in the literature, many issues emerge from critiques of their theoretical bases, empirical implications and methodological rigour. First, Graf (2007) argues that there is no universal agreed definition on what establishes a learning style. The key concept of a learning style overlaps other terminologies, such as 'cognitive style' or 'learning strategy' (Peterson, Rayner and Armstrong, 2009). Entwistle (1991) has attempted to distinguish between the term's 'strategy' and 'style' in this regard, with a strategy being considered as a preferred way of approaching a particular task and a style being associated with preferences that are more closely related to the psychological concept of a cognitive style. This means that

learning strategies or approaches are less-stable features of task performance and responses to circumstances. However, Coffield et al. (2004) clarify that learning styles are a general umbrella that can include other terminologies. Accordingly, they classify learning style theories into five families: 'constitutionally-based learning styles and preferences', 'cognitive structure', 'stable personality type', 'flexibly stable learning preferences', and 'learning approaches and strategies.

2.7   Universal Design Learning Theory

The empirical application of learning styles focuses on accommodating learning contents to learners' individual preferences. Another learning theory, however, suggests that addressing environmental learning limitations in terms of curricular design is a key aspect of responding to learners' needs. The main concepts of this theory and its impact on e-learning acceptance and learners' perceptions are discussed in this section. The term 'Universal Design' was coined by the innovative architect Ronald Mace in the 1970s, referring to the way in which products and environments are designed to be optimally usable, without the need for special accommodation or adaptive design (Center for Universal Design, 2015). Embracing Universal Design in architecture can therefore lead to the construction of buildings that are accessible to all, including people with disabilities, without the need for retrofitting. It also provides options for users to choose what will be most convenient for them. Synonyms of Universal Design are 'inclusive design', as it is known in the UK and 'design for all', as it is known across most of Europe (Clarkson & Coleman, 2015). This framework includes seven basic principles:

- Equitable use: The concept of equitable use posits that each principle should account for a diverse use to the general population while drawing the design process

- Flexibility of use: because people vary in choices and preferences, these should be taken into account

- Simple and intuitive use: designs should not be complex to use. It should be easy to comprehend, regardless of the user's prior experience or knowledge. It should involve easy steps

- Perceptible information: the design should be able to effectively communicate the necessary information to all users, irrespective of the ambient conditions or their sensory abilities.

- Tolerance for error: errors due to unintentional actions should be reduced to the barest minimum in the designing of the framework

- Low physical effort: minimal physical effort that guarantees comfortable use should be a factor considered during the design.

- Size and space for approach and use: the design should account for all bodily sizes, posture and space for those with disabilities in a bid to facilitate ease of use

Universal Learning Theory is therefore grounded on the principles of Universal Design. The main concern of this theory is how to design flexible and accessible curricula that respond to learners' needs, irrespective of their individual differences or preferences. Three frameworks are hereby proposed for the design of accessible learning: Universal Design of Instruction (UDI), Universal Instructional Design (UID) and Universal Design for Learning (UDL) (Rao, Ok, & Bryant, 2014). The present research uses the UDL model, which is increasingly attracting the attention of researchers and educators as an effective solution for designing an accessible learning environment (Kumar & Wideman, 2014; Rao et al., 2014; Mangiatordi & Serenelli, 2013).

The Center for Applied Special Technology (CAST) proposed the UDL framework in 2002, as an iteration of Universal Design (Rose & Meyer, 2002). The model has been revised over the years, being presented as UDL 2.0 in 2011 (CAST, 2011). CAST defines UDL as: "a framework that addresses the primary barrier to fostering expert learners

within instructional environments: inflexible, "one-size-fits-all" curricula. It is an inflexible curriculum that raise unintentional barriers to learning" (CAST, 2011, p.4). CAST argues that learners' interaction with inflexible instructional content, goals, approaches and assessments are the primary barriers to learning and therefore, it is not within individual ability or capacity that the limitations lie.

UDL's evidence-based principles are grounded on research in neuroscience, relating to the way in which the human brain activates three main neural networks during any instructional experience (CAST, 2015). Rose and Strangman (2007) state that in every cognitive act, neuropsychological research identifies "three distinct functions". These include a component which recognizes patterns, another which plans and generates patterns and a third which selects the most important patterns. The above framework can be divided into two layers: a conceptual layer made up of three networks and an implementation layer consisting of three principles. The three networks are defined as follows:

- The recognition network: this represents the 'what' of the learning or input; learners use different ways of categorising 'what' they see, hear and read.

- The strategic network: this represents the 'how' of learning or expression; learners use different ways of organising and expressing their thoughts and ideas.

- The affective network: this represents the 'why' of learning or engagement; different methods can be applied to engage learners and keep them excited and interested.

- In 2002, CAST researchers theorized a set of three principles corresponding to the three learning networks. The key concepts underlying these principles comprise adopting multiple means of content delivery, diverse methods of expression and assessment, and various means of engagement (Rose & Meyer, 2002). The three principles are described below:

- Providing multiple means of representation: this principle suggests presenting learning content in different ways; for instance, video, audio, text, graphs and other multimedia. This can offer better opportunities for all learners, whether disabled or able-bodied.

- Providing multiple means of action and expression: most learners would rather not have their understanding and knowledge assessed exclusively via formal examinations. This is due to the restricted time and organizational setting of this measurement. Therefore, asking students to express their understanding in other formats, such as assignments, interviews, short quizzes, scientific papers and multimedia presentations can reflect their knowledge more effectively than using a single measurement.

- Providing multiple means of engagement: using only a lecture format may negatively affect learners' engagement. Hence, to maintain levels of interest during a lecture, other strategies can be used to motivate students, such as delivering learning content through open discussion, question and answer (Q&A) sessions, peer-tutoring, and an applied problem-solving approach.

In addition to the above, these three principals include nine guidelines and 31 checkpoints, to be followed when adopting this model (see Table 2.1, below), whereas Figure 2.8 illustrates the main networks and principles of the UDL framework.

Table 2.1: UDL Guidelines and Checkpoints

Universal Design for Learning Guidelines		
I. Provide Multiple Means of Representation	II. Provide Multiple Means of Action and Expression	III. Provide Multiple Means of Engagement
1: Provide options for perception 1.1 Offer ways of customizing the display of information 1.2 Offer alternatives for auditory information 1.3 Offer Alternatives for visual information	4: Provide options for physical Action 4.1 Vary the methods for response and Navigation 4.2 Optimize access to tools and assistive technologies	7: Provide options for recruiting Interest 7.1 Optimize individual choice and Autonomy 7.2 Optimize relevance, value, and Authenticity 7.3 Minimize threats and distractions
2: Provide options for language, mathematical expressions, and symbols	5: Provide options for expression and communication 5.1 Use multiple media for	8: Provide options for sustaining effort and persistence 8.1 Heighten salience of goals and

2.1 Clarify vocabulary and symbols	Communication	Objectives
2.2 Clarify syntax and structure	5.2 Use multiple tools for construction	8.2 Vary demands and resources to optimize challenge
2.3 Support Decoding of text, mathematical notation, and symbols	and composition	
	5.3 Build fluencies with graduated	8.3 Foster collaboration and Community
2.4 Promote Understanding across languages	levels of support for practice and Performance	8.4 Increase mastery-oriented Feedback
2.5 Illustrate through multiple media		
	6: Provide options for executive	
3: Provide Options for comprehension	Functions	9: Provide options for self-Regulation
	6.1 Guide appropriate goal-setting	
3.1 Activate or Supply background knowledge	6.2 Support planning and strategy	9.1 Promote expectations and beliefs that optimize motivation

3.2. Highlight patterns, critical features, big ideas, and relationships 3.3 Guide Information processing, visualization, and manipulation 3.4 Maximize transfer and generalization	Development 6.3 Facilitate managing information and resources 6.4 Enhance capacity for monitoring Progress	9.2 Facilitate personal coping skills and strategies 9.3 Develop self-assessment and Reflection
Resourceful, knowledgeable learners	Strategic, goal-directed learners	Purposeful, motivated learners

2.8   Summary

This chapter presented a critical review of e-learning adoption studies. It has also been discovered from literature that though, a number of researchers have carried out investigations of e-learning adoption on different group of users, particularly tertiary institution community in Nigeria and other developing countries, and however, there is a lack of research with regards to the e-learning adoption among tertiary institution students within Southwest Nigeria. Studies reveal that there is low adoption of e-learning by students in Nigerian tertiary institutions a as a result of some environmental challenges and learning patterns. Few attempts made by researchers in other geopolitical zones of Nigeria focused on challenges, prospects and perceptions of e-learning adoption, most of which were case studies (Jovana., 2014, Anene, et al., 2014, Egbokhare, 2013; Yakubu & Salihu, 2019, Ramzani and Suleiman, 2019, Ajidoku (2020), Oye, Mazleena and Lahad, 2011). The chapter also presented the foundational theories from which the constructs of the proposed model for this study was adapted. These include the TAM, UDL Framework and LST. One of the widely used models for technology adoption is TAM. It has also been widely applied in the e-learning context. The limitation of this model is that it fails to consider the influence of environmental variables, cultural differences and learning styles (individual differences) on user's technology adoption (Al-Azwei, 2016; Marangunic & Granic, 2015). Also, little is known about the influence of environmental factors and learning styles on e-learning adoption in Nigerian literatures. Therefore, to the best of the researcher's knowledge, no previous study has been able to propose a model to predict the causes of low adoption of e-learning in tertiary institutions using environmental and learning styles moderators.

CHAPTER 3: RESEARCH METHODOLOGY

3.1   Preamble

This chapter focuses on how this research was conducted, specifically the research approach, subjects (participants), measurements, data-collection and analysis methods are discussed. Also, it takes into account the procedures/methods that have been employed in this research.

3.2   Research Approach

Preliminary literature synthesis was done to determine model constructs and establish hypotheses that were later tested for the study. This research adopted a quantitative approach, leveraging a survey instrument in gathering of data as well as analysing the collected data. It precisely adopted an analytical and descriptive survey research design. The research is investigative in nature, thus the use of surveys. This is basically due to the fact that the research focuses on investigating the e-learning adoption of students in the tertiary institutions within Southwest Nigeria. Hence, the best way suitable for easier and effective way of gathering data is via a quantitative method, by administering surveys to the diverse students in Southwest Nigerian tertiary institutions.

3.3   Subjects/Participants for the Study

This research is carried out to investigate the perception of students in higher education institutions (such as universities, colleges, and other higher educational institutions) within Southwest Nigeria. Undergraduate and postgraduate students actively studying in these institutions participated in this research. They are the target focus and a survey-based investigation was carried out on them, to find out about their behaviours/attitudes towards e-learning adoption. Going by research standards, the accepted rule of 28 for surveys, 5% of margin error, 95% of confidence level and 20% of response rate of the

intended population is accepted (McCall, 1982). Therefore, the researcher conveniently and purposively selected 300 students in tertiary institutions within Southwest Nigeria for the research.

3.4 Measurements

The most appropriate/suitable instrument that can be used in an empirical survey investigation is the use of questionnaires to help in evaluating user's response based on appropriate constructs. The proposed research therefore adopted questions from survey instrument used by related previous studies reviewed (Al-Azwei et al, 2016) for data collection. This instrument has been used already by the previous studies from which they were strategically adapted; however, the items adopted were re-validated and tested for reliability in the country of study (Nigeria) as the instruments have not been used in such area before. In order to apply directly and more specifically to the current research setting, some of the questionnaire items were duly modified.

The constructs that were used were also adapted from previous literature based on the TAM (Venkatesh & Bala, 2008), UDL (CAST, 2020) and Felder and Silverman LST (Felder, 1996), as explained earlier in the chapter two above. The moderating variables that were used in this research consist of student's perceptions of such environmental factors (instructional and physical) and learning styles in e-learning context. Specifically, the constructs used in this research are: E-learning Adoption (ELA) which served as the Dependent Variable (DV), while the construct for the Independent Variables (IVs) are: Perceived Ease of Use (PEOU), Intension to Use (ITU), E-learning Self-Efficacy (ELSE), Perceived Usefulness (PU), Perceived Satisfaction (PS), Perceived Barriers (PB), Technological Skills (TS) and Perceived Instructor Quality (PIQ). Each of the measures is being explained clearly below.

3.4.1 Perceived Ease of Use (PEOU)

According to Davis (1986), PEOU refers to the extent of mental effort required to use a technology. Another synonym of PEOU is 'performance expectancy' as it is referred to in UTAUT (Venkatesh et al., 2003). Earlier literature advocates the use of PEOU as a predictor of e-learning adoption (Al-Gahtani, 2016; Liu et al., 2010; Weng, Tsai, & Weng, 2015). The PEOU scale was used to measure students' perception on the extent of required mental effort to use e-learning technology. The items of this scale was measured on a 5-likert reversed-response scale, ranging from Strongly Disagree-1, Disagree-2, Neutral-3, Agree-4, and Strongly Agree-5. In order to ensure that the items attained a quite reasonable level of reliability, a reliability analysis was conducted using Cronbach Alpha Coefficient Method.

3.4.2 Perceived Usefulness (PU)

Davis (1986) defines PU as a user's belief that the adoption of a particular technology can improve his or her performance. As mentioned in earlier research, PU is also known as 'performance expectancy' in UTAUT (Venkatesh et al., 2003). The significant influence of PU on behavioural intention has been highlighted in many studies, and Hwang et al. (2015) reported that this relationship is consistent in the literature. Liaw (2008) demonstrates that PU is the strongest predictor of the behavioural intention towards e-learning adoption. The PU scale was used to measure students' perceptions of their performance improvement suing e-learning technology. The item of this scale was measured on a 5-likert reversed-response scale, ranging from Strongly Disagree-1, Disagree-2, Neutral-3, Agree-4, and Strongly Agree-5. In order to ensure that the items attained a quite reasonable level of reliability, a reliability analysis was conducted using Cronbach Alpha Coefficient Method.

3.4.3 E-Learning Self-Efficacy (ELSE)

Tarhini et al. (2014b) define ELSE as "a student's self-confidence in his or her ability to perform certain learning tasks using the e-learning system" (pp.167-168). According to Bandura (1990), people's beliefs about their capabilities can influence their choices, the effort that they should exert and how long they are prepared to persevere in facing difficulties. Users with a low perception of their ability to use a technology may not persist in tackling the obstacles that face them.

The ELSE scale measured students' perception of their abilities to perform learning tasks using the e-learning technology. The items of this scale were measured on a 5-likert reversed-response scale, ranging from Strongly Disagree-1, Disagree-2, Neutral-3, Agree-4, and Strongly Agree-5. In order to ensure that the items attained a quite reasonable level of reliability, a reliability analysis was conducted using Cronbach Alpha Coefficient Method.

3.4.4 Perceived Barriers

PB is defined as user's perception of associated difficulties in using a technology (Jokiaho et. al., 2018). The Perceived Barriers scale measured the level of inconvenience the student experienced in e-learning technology. The items of this scale were measured on a 5-likert reversed-response scale, ranging from Strongly Disagree-1, Disagree-2, Neutral-3, Agree-4, and Strongly Agree-5. In order to ensure that the items attained a quite reasonable level of reliability, a reliability analysis was conducted using Cronbach Alpha Coefficient Method.

3.4.5 Intention to Use (ITU)

Intention to use (ITU) is defined as a user's cognitive representation of his or her willingness to perform certain behaviours (Ajzen & Fishbein, 1980). It has been identified in all the theories discussed in Chapter Two, as a direct predictor of actual usage. Ajzen

and Fishbein (1980) argue that the intention of human beings to perform or not perform a particular behaviour represents one of the most important determinants of their actions. In the existing literature, this assumption has been widely supported (Tarhini, 2013; Taylor & Todd, 1995b; Venkatesh et al., 2003). However, Taylor and Todd (1995a) found that users' experience can significantly affect the relationship between ITU and actual usage. Moreover, the behavioural intention of users with previous experience of a particular technology can be more effective for predicting technology usage than it is in users with less experience.

ITU scale was used to measure students' perceptions of their willingness to use e-learning technology. The items of this scale were measured on a 5-likert reversed-response scale, ranging from Strongly Disagree-1, Disagree-2, Neutral-3, Agree-4, and Strongly Agree-5. In order to ensure that the items attained a quite reasonable level of reliability, a reliability analysis was conducted using Cronbach Alpha Coefficient Method.

3.4.6 Perceived Instructor Quality (PIQ)

PIQ is viewed as the user's beliefs of the instructor qualities which may affect technology acceptance. Studies have found that instructor's quality is a predictor for e-learning adoption (Cheng, 2012; Tawalbeh, 201; Ozkan & Koseler, 2009). The PIQ scale was used to measure students' perception of instructor quality which may affect their e-learning adoption. The items of this scale were measured on a 5-likert reversed-response scale, ranging from Strongly Disagree-1, Disagree-2, Neutral-3, Agree-4, and Strongly Agree-5. In order to ensure that the items attained a quite reasonable level of reliability, a reliability analysis was conducted using Cronbach Alpha Coefficient Method.

3.4.7 Perceived Satisfaction (PS)

PS means "the sum of students' behavioural beliefs and attitudes that result from aggregating all the benefits that a student receives from using BELS". It has been found to be a predictor of e-learning adoption (Wu et al., 2010, p.157, AL-Azwei, 2016). PS scale was used to measure students' perceptions and attitudes towards e-learning adoption as a result of the benefits they derive from e-learning technology. The items of this scale were measured on a 5-likert reversed-response scale, ranging from Strongly Disagree-1, Disagree-2, Neutral-3, Agree-4, and Strongly Agree-5. In order to ensure that the items attained a quite reasonable level of reliability, a reliability analysis was conducted using Cronbach Alpha Coefficient Method.

3.4.8 Technological Skills (TS)

TS describe user's computer competency level to use technologies which have been found to be a predictor of technology adoption (Kanwal & Rehman, 2017). The TS scale measured students' competency level for computer skils. The items of this scale were measured on a 5-likert reversed-response scale, ranging from Strongly Disagree-1, Disagree-2, Neutral-3, Agree-4, and Strongly Agree-5. In order to ensure that the items attained a quite reasonable level of reliability, a reliability analysis was conducted using Cronbach Alpha Coefficient Method.

3.4.9 Perceived Cost (PC)

PC is defined as user's beliefs of the required fund to use technology. This has been found to predict e-learning adoption (Bello & Mohammed, 2017). The PC scale was used to measure students' perception of the cost of e-learning systems which may influence their adoption. The items of this scale were measured on a 5-likert reversed-response scale, ranging from Strongly Disagree-1, Disagree-2, Neutral-3, Agree-4, and Strongly

Agree-5. In order to ensure that the items attained a quite reasonable level of reliability, a reliability analysis was conducted using Cronbach Alpha Coefficient Method.

3.4.10 E-learning Adoption (ELA)

ELA scale was used to measure the actual e-learning technology adoption behaviour of students. The items of this scale were measured on a 5- Likert reversed-response scale, ranging from Never-1, Rarely-2, Sometimes-3, Often-4, and Always-5. In order to ensure that the items attained a quite reasonable level of reliability, a reliability analysis was conducted using Cronbach Alpha Coefficient Method.

Table 3.1: Summary of the Meaning of Constructs

CONSTRUCT	MEANING
Perceived Ease of Use (PEOU)	Users' beliefs about how much mental effort is required to use any technology (Davis, 1986)
Intension to Use (ITU)	"The cognitive representation of a person's readiness to perform a given behavior" (Punnoose, 2012, p.305).
Perceived Satisfaction (PS)	"The sum of students' behavioural beliefs and attitudes that result from aggregating all the benefits that a student receives from using BELS" (Wu et al., 2010, p.157).
E-learning Self-Efficacy (ELSE)	"A student's self-confidence in his or her ability to perform certain learning tasks" (Tarhini et al., 2014, Bello & Mohammed, 2017).
Perceived Cost (PC)	User's beliefs of the required fund to use technology (Bello & Mohammed, 2017).
Perceived Instructor Quality (PIQ)	User's beliefs of the instructor qualities (Cheng, 2012; Tawalbeh, 2011; Ozkan & Koseler, 2009)
Technological Skills (TS)	User's computer competency level to use a technology (Kanwal & Rehman, 2017)
Perceived Barriers (PB)	User's perception of associated difficulties to use a technology (Jokiaho et. al.,2018)
Perceived Usefulness (PU)	User's belief that the adoption of a particular technology can improve his or her performance (Davis, 1989, Weng et al., 2015))

Table 3.2: Summary of hypotheses proposed in the present study for Research

Objective 1

	Hypotheses	References
H1a	There is a relationship between student's Perceived ease of use (PEOU) and E-learning Adoption (ELA)	(Venkatesh & Bala, 2008, Al-Azwei et al, 2016)
H2a	There is a relationship between student's Intention to Use (ITU) and E-learning Adoption (ELA)	(Venkatesh & Bala, 2008, Al-Azwei et al, 2016)
H3a	There is a relationship between student's Perceived Satisfaction (PS) and E-learning Adoption (ELA)	(Venkatesh & Bala, 2008, Al-Azwei et al, 2016)
H4a	There is a relationship between student's E-learning self-efficacy (ELSE) and E-learning Adoption (ELA)	(Tarhini et al., 2014, Bello & Mohammed, 2017)
H5a	There is a relationship between student's Perceived Barriers (PB) and E-learning Adoption (ELA)	(CAST, 2002)
H6a	There is a relationship between student's Perceived Usefulness (PU) and E-learning Adoption (ELA)	(Venkatesh & Bala, 2008)
H7a	There is relationship between student's Technological Skills (TS) and E-learning Adoption (ELA)	(Bello & Mohammed, 2017)
H8a	There is a relationship between student's Perceived Instructor Quality (PIQ) and E-learning Adoption (ELA)	(Almaiah, Al-Khasawneh & Althunibat, 2020).
H9a	There is a relationship between student's Perceived Cost (PC) and E-learning Adoption (ELA)	(Bello & Mohammed, 2017)
H10a	There is a relationship between student's instructional environment and E-learning Adoption (ELA)	(Azwei et al, 2016)
H11b	There is a relationship between student's learning styles and E-learning Adoption (ELA)	(Azwei et al, 2016)

3.4.11 Moderators and Mediator: Differences, Similarities and Application

Although mediator and moderator factors both contextualize the effect of other variables and are correlational in nature, their applications differ when investigating the

causal relationship between independent and dependent variables (Cucos, L., 2022). Moderator (moderating variables) influences the direction and intensity of the relationship, Mediator (mediating variables) shows the method by which two variables relate – revealing connection between two variables (Burcu Arslan, 2023).

The dependent variable in an experiment is typically the one that is influenced by the other independent factors, and it is this variable that the researcher typically measures or evaluates by altering the independent variables. In contrast, an independent variable is one that affects the experiment's dependent variable's position, status, or measurement. Similar to moderator, mediator is a term used by researchers to describe two independent variables that are used to illustrate correlations between the variables. By exerting their effects on the other factors, the moderating variables have an impact on them. While mediating variables explain the causal connection between the variables in order to show the relationship between them (Savants, C., 2022).

The primary distinction between a mediator and a moderator is that one defines the relationship, whereas the latter demonstrates the affects or effects of the third component on the interaction between the other two variables (Savants, C., 2022).

When it comes to defining the research and emphasizing the connections and affects of outside factors or parties, the researcher might benefit from the usage of moderator and mediator variables. The researcher emphasizes the relationship between the two variables by using a mediating variable. It aids in improving knowledge of connections and causes and effects. Similar to this, researchers utilize moderation variables to demonstrate the circumstances or to identify the elements that may have an impact on the research variables and outcomes. They strengthen the research such that it no longer focuses solely on researching variables in isolation and their relationships. However, it aids researchers

in include other parts of their research—aspects that are distinct from those already covered—into their work (Savants C., 2022).

3.4.11.1 Active/Reflective and Sequential/Global Learning Styles

In this research, the moderating effect of learning styles such as the processing (active/reflective) and understanding (sequential/global) dimensions of the path's strength between the model's constructs were tested. This investigation was based on the findings of previous studies, whereby learning styles have been able to moderate e-learning adoption (see Chapter Two). However, previous studies witnessed low number of learners with intuitive and verbal preferences. (Al-Azwei, 2016), thus the moderating influence of perception (sensing/intuitive) and input (visual/verbal) dimensions were not examined. The meaning of these constructs has been explained in chapter two.

3.4.11.2 Context/Data Collection Techniques

In order to understand the relationship between learning styles and learners' achievement, various levels of short two programming courses were selected. The modules chosen were influenced by the instructors of these courses who encouraged their students to participate. Furthermore, the two modules focused on programming languages, whereas many other studies have attempted to link learners' performance on programming courses with their individual learning styles (Allert, 2004; Thomas et al., 2002; Shaw, 2012). During the 6-week period of this course, all the modules were mandatory to the students. The course comprised of a two-hour weekly routine of theory and a two-hour weekly practical session.

The theoretical aspects of the course were delivered in the classroom, whereas problem-solving tasks which required hands-on approach were performed in laboratories. Throughout the period of the course, the students were encouraged to communicate and

interact while trying to solve the problems. This was achieved through chat applications such as Wiki and a forum was set up for them as well.

For every course, extra materials and reading resources were made available on their shared drive (Module). Apart from active class participation, the course also carried a minimum of 50% pass mark. The modules that were included in the present research are:

- Fundamentals of Programming Language II: A first-year module covering the fundamentals of the C++ programming language.
- Dynamic HTML: A second-year module, consisting of an introduction to HTML, CSS, Java Script and HTML5.

At the end of the course, an overall assessment was done for each aspect of the course. The highest possible mark was 50%, calculated thus;

- By grading two online theory exams in Module, consisting of a variety of questions, including multiple-choice, true-or-false, short-answer and fill-in-the-blank items. The purpose of these exams is to assess learners' knowledge of the theoretical concepts of the respective module.
- By conducting two laboratory tests measuring students' problem-solving ability.
- Through other learning activities, such as participation in online and classroom activities and attendance.

For the purpose of this research, two questionnaires were used in this experiment. The ILS questionnaire was administered to identify learning styles and the second questionnaire was designed to measure other constructs of the proposed e-learning adoption model. The questionnaires were administered at the end of the course online.

3.4.11.3 The Index of Learning Styles (ILS)

The ILS questionnaire is a 44 forced-choice questionnaire proposed by Felder and Soloman (n.d.) to infer learning styles in accordance with the Felder and Silverman Model (Felder & Silverman, 1988). It targets four dimensions. 11 questions are used to identify each dimension. The questions can be answered by choosing either 'a' or 'b'. Van Zwanenberg, Wilkinson and Anderson (2000) pointed out that one of the main issues in the dichotomous nature of questionnaires is the difficulty of implementing standard statistical methods. Accordingly, the above researchers suggest using a value of 1 for (a) Items, and 0 for (b) Options. This binary method was used in the present study and accordingly, the total scores for each style ranged from 0-11. Each dimension includes two dichotomies: a score of 0-1 indicates a strong style for the left axis; 2-3, a moderate style for the left axis; 4-5, a mild style for the left axis; 6-7, a mild style for the right axis; 8-9, a moderate style for the right axis, and 10-11, a strong preference for the right axis.

3.4.11.4 UDL-Instructional Environment

In order to properly address the individual learner's needs, the UDL is used to reduce environmental learning limitations (AL-AZwei, 2016). According to Al-AZwei, its three principles are predictors of learners' perceptions and behavioural intention towards e-learning. Meyer, Rose and Gordon (2014) indicate that this framework exploits the flexibility of learning technologies to design educational contexts that provide options for different learners from the start. However, environmental factors such as technological, instructional, administrative and infrastructural variables, as well as cultural and individual differences (particularly learning styles) have been identified studies to influence e-learning adoption in Nigeria (Almaiah, Al-Khasawneh & Althunibat, 2020; Anene, et al., 2014; Yakubu & Salihu, 2019; Ramzani and Suleiman, 2019; Ajidoku, 2020; Oye, Mazleena & Lahad, 2011). Therefore, this present study investigated the

moderating effects of UDL instructional and physical variables on e-learning adoption of students in tertiary institutions within Southwest Nigeria. According to Al-Zwei (2016), previous studies have not yet investigated the direct predictive ability of UDL applied to e-learning adoption and learners' perceptions, although variables, which to some extent resemble the principles of UDL, have been incorporated with different technology acceptance theories.

3.4.11.5 Context/Data Collection Techniques

The course was designed strictly abiding by UDL principles. A blended approach was used to deliver the course which comprised classroom lectures and through Module. The design includes a representation of learning content, methods of knowledge expression and assessment, and means of student engagement. Module was widely used on this course to deliver the learning content using multiple methods, in order to engage the students; notify them of any upcoming activities; discuss the learning content; receive uploaded assignments, and administer online theory exams.

The module covers the main principles of website design using HTML (HyperText Markup Language), CSS (Cascading Style Sheet), and JavaScript. These three concepts (HTML, CSS and JavaScript) complement each other in the designing of interactive websites. The first five lectures included general concepts of Web design and HTML. These lectures were carefully tailored to embrace UDL environmental principles, as follows: Multiple Means of Representation (MMR), Multiple Means of Action and Expression (MMAE) and Multiple Means of Engagement (MME).

Data was collected through a research questionnaire. At the end of Week Six, the research questionnaire was posted on the announcement page of the course site, Module. All students were requested and encouraged to complete the instrument in their free time and it was emphasized that their feedback is important for enhancing e-learning

implementation in public-sector universities in Southwest Nigeria, as well as for specifically developing the corresponding course design. The same variables and items used in the research questionnaire in the first experiment were adopted to evaluate the effect of UDL principles on e-learning adoption and learners' perceptions. However, in order to measure UDL principles, extra items were added. These included multiple means of representation (MMR): three items; multiple means of action and expression: (MMAE): four items; and multiple means of engagement (MME): four items. All questions were adapted from previously examined instruments (Liaw, 2008; Said, Kirgis, Verkamp & Johnson, 2015; Smith, 2012). Furthermore, it was clarified that the students' instructor would not be able to access the results and as such, the students could freely express their true perceptions, without fearing that this would affect their grades. Moreover, the data was gathered by the present researcher, who did not have a direct relationship with the students.

Table 3.3: Summary of hypotheses formulated in the present study for Research Objective 2

	Hypotheses	References
H1b	There is a moderating effect of instructional environment and learning styles on the relationship between student's Perceived ease of use (PEOU) and E-learning Adoption (ELA)	(Venkatesh & Bala, 2008, Al-Azwei et al, 2016)
H2b	There is a moderating effect of instructional environment variables and learning styles on the relationship between student's Intention to Use (ITU) and E-learning Adoption (ELA)	(Venkatesh & Bala, 2008, Al-Azwei et al, 2016)
H3b	There is a moderating effect of instructional environment and learning styles on the relationship between student's Perceived Satisfaction (PS) and E-learning Adoption (ELA)	(Venkatesh & Bala, 2008, Al-Azwei et al, 2016)
H4b	There is a moderating effect of instructional environment and learning styles on the relationship between student's E-learning self-efficacy (ELSE) and E-learning Adoption (ELA)	(Tarhini et al., 2014, Bello & Mohammed, 2017)
H5b	There is a moderating effect of instructional environment and learning styles on the relationship	(CAST, 2002)

		between student's Perceived Barriers (PB) and E-learning Adoption (ELA)	
H6b	There is a moderating effect of instructional environment and learning styles on the relationship between student's Perceived Usefulness (PU) and E-learning Adoption (ELA)	(Venkatesh & Bala, 2008)
H7b	There is a moderating effect of instructional environment and learning styles on the relationship between student's Technological Skills (TS) and E-learning Adoption (ELA)	(Bello & Mohammed, 2017)
H8b	There is a moderating effect of instructional environment and learning styles on the relationship between student's Perceived Instructor Quality (PIQ) and E-learning Adoption (ELA)	(Almaiah, Al-Khasawneh & Althunibat, 2020).
H9b	There is a moderating effect of instructional environment and learning styles on the relationship between student's Perceived Cost (PC) and E-learning Adoption (ELA)	(Bello & Mohammed, 2017)

Table 3.4: Summary of the meaning of moderating constructs for the study

CONSTRUCTS	MEANING
Learning styles	**"Characteristic strengths and preferences in the ways… learners' take in and process information" (Felder, 1996, p.18)**
Processing (Active/Reflective)	Active learners prefer to study in groups and undertake learning tasks immediately, while reflective learners apply analytical approaches and prefer to study alone.
Perception (sensing/intuitive)	'Sensing' learners favour facts and follow their tutor's approach to problem-solving, whereas intuitive learners tend to prefer complex content and apply their own innovation approaches.
Input (Verbal/Visual)	Preferred ways of receiving information: visual learners prefer videos, demonstrations, pictures and graphs. In contrast, verbal learners prefer written materials and listening to explanations provided by others.
Understanding (Sequential/Global)	Sequential learners focus on details and study step by step, whereas global learners connect all concepts together in order to understand the bigger picture before looking at the details.
UDL-principles of instructional environment	**Primary barriers to fostering expert learners within instructional environment (CAST, 2012)**

Multiple Means of Representations (MMR)	Tutors need to present learning content and information using multiple means. This can assist learners in mastering learning content with less effort.
Multiple Means of Action and Expression (MMAE)	An essential step in the learning process, whereby students are given a chance to express their understanding.
Multiple Means of Engagement (MME)	In order to engage students, they should be stimulated and motivated in different ways and through various actions.

3.5   Conceptual E-Learning Adoption Model

Based on the constructs discussed and hypotheses formulated for research objective 2 (H1b-H9b) above, the following e-learning adoption model was proposed by the researcher for students in tertiary institutions within Southwest Nigeria.
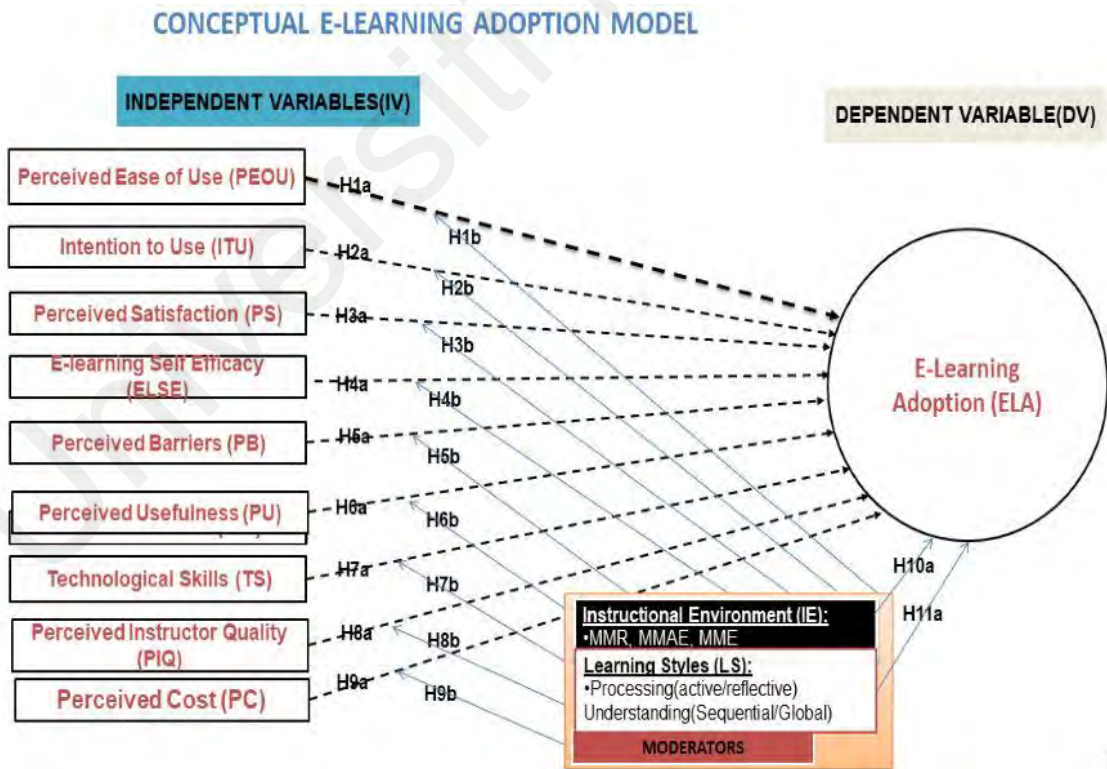

Figure 3.1: Proposed Conceptual E-learning Adoption Model

3.6   Sampling

Obviously, it is practically impossible to carry out an investigation on an entire population, especially in the case of the current research in tertiary institutions within Southwest Nigeria which adopted a quantitative approach through the use of questionnaire surveys. Thus, there is a need to sample the population. Sampling can be referred to as an approach which gives researchers a chance in inferring information regarding a population on the basis of the results from the population's subset, thus not needing to conduct investigation on each individual in that population. There are basically two categories of sampling, which are probability and non-probability sampling, with diverse specific types. This research employed a simple-random sampling method, which is one of the types of the probability sampling. Simple random sampling is a kind of sampling that gives an equal chance or probability to every member of the intended population to be selected for participation in the study (Patten & Newhart, 2017). Regarding the sample size calculation, generally according to literature and the generally accepted rule for surveys, 5% of margin error, 95% of confidence level and 20% of response rate of the intended population is accepted (McCall, 1982). In view of this, since the students are from different random tertiary institutions within Southwest Nigeria, and their exact population size cannot be determined, the researcher made use of an online sample size calculator (Qualtrics, 2019) to find out the required number of respondents by inputting about 1 million as the population size. From the calculation, it was discovered that at least 385 respondents were needed as participants for the study.

3.7   Validation of Instruments

Validation involves collecting and analysing data to access the accuracy of an instrument. In this research data was collected appropriately and analysed by performing well conducted statistical tests as mentioned earlier. The research hypotheses were tested and validated to provide inferences. Thus, the validity of the quantitative instrument

initially passed through pilot testing by some experts just to find out about the simplicity and understanding of the items in order to ensure relia78bility and validity of the instrument before final collections. However, since the tools to be used are not totally new ones, and have been validated by previous scholars in other countries, there was need for a pilot study analysis to re-validate the instruments in the country of study (Nigeria). With regards to the validation of the instrument by experts, at the initial stages of the survey development, the researcher ensured that the supervisory committee set up by the faculty carried out critical investigations on the survey questionnaire items, hence checking if they will be suitable for the intended population. Also, grammar checks as well as inconsistency checking were carried out by some Ph.D. experts in the field of computer science, before finally publishing the survey online.

3.8   Data Collection Method

After performing two experiments as described above, the period of data collection spanned for about two months. This was so because the survey was administered via an online means, hence the researcher had no direct contact with the respondents. This research employed the use of online survey to collect data. Primary data was collected and used for this research. The research instrument used is survey, delivered via online mediums. The survey was sent to students in tertiary education in schools within the Southwest of Nigeria. The online survey was sent through several online channels such as emails, students WhatsApp groups, students Telegram groups and other social media channels. The survey required an email to access it thus reduced the chances of duplicate responses. Among several options of online survey tools such as Kwiksurveys, Survey Monkey, Google Forms etc., the research employed Google Forms because of how familiar the students are with it. Google Forms gives real time monitoring and preliminary analysis, charting and graphing capabilities. And these were leveraged to track, collate

and monitor responses. The results were collated into a Google spreadsheet for further analysis.

3.9   Analysis and Interpretation

A quantitative approach was utilized for the analysing data that was collected for the study. Hence data was analysed using statistical procedures, which involved a combination of both descriptive and inferential statistics, in order to have clearer understanding of the data and to make conclusions. The tool used in analysis of the data is Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics was conducted to understand the nature of the overall data. Tests such as mean and standard deviation were utilized for clearer data description. While all major objectives and questions of the research were answered via the conduct of inferential statistics.

The first research question was analysed via Pearson's Rho Correlation test. Furthermore, the second question was answered through multiple regression analysis. The third research question was answered via the conduct of a Multiple Regression Analysis; through the Multiple Regression Analysis, independent variables of the research were tested on the Dependent variable to find out how each IV predicts the DV and to identify the most influencing IVs according to hierarchy, which produced the final factors for the proposed e-learning adoption model in the final research question. In addition, the proposed e-learning adoption model was evaluated via the following metrics: Normality Test, Reliability Test and Hypothesis Testing. The proposed model underwent a Normality Test to see if all the data were normalized, reliability test was conducted to ensure that all the constructs of the model had a good Cronbach Alpha, and the hypothesis was tested so as to make final modifications to the model by either accepting (+) or rejecting (-) the postulated hypothesis and coming up with the final inferences.

3.10 Summary

This chapter has provided the detailed methods and approach that was used in development of the e-learning adoption model for students in the tertiary institution within Southwest Nigeria. More specifically, it comprehensively discussed the participants of the study, measurements, data collection method, data analysis and interpretation, as well as the validation process. Thus, the next chapter shall provide the results gotten from data analysis, backed up with discussions from the obtained results.

CHAPTER 4: RESULT AND DISCUSSION

4.1 Preamble

In the finding and analysis, it becomes important to analyse data that has been collected so as to establish statistical facts and patterns that either confirms or rejects the hypothesis formulated. To achieve this, standardized test is usually utilized. Thus, in this research, four main tests analysis were employed: Reliability test, Descriptive statistics and analysis, Regression and the test of hypothesis. Each of the tests are important as they set to establish some statistical patterns in various ways that becomes important to the research itself.

4.2 Reliability Test

Reliability test is defined as the extent to which a test measures without error (Franzen, 2011). Further explanations shows that it can be likened to precision, which is the extent to which measurement occurs without error. In simple terms, it explains the consistency in the data that has been collected to be analysed. Level of consistency matters a lot because it determines if the data that has been collected is suitable to be used for further analysis that would be carried as reliability test is always the first test that is performed on a collection of data. The reliability test conducted is shown below.

Table 4.1: Reliability Test: Listwise deletion based on all variables in the procedure

Case Processing Summary		N	%
Cases	Valid	370	100.0
	Excluded[a]	0	.0
	Total	370	100.0

The case processing summary table shows N which is the total number of sample size, the total number of data that have been excluded which is 0 and total number of entry data that have been collected. It further displays the total percentage, in all, total number of data collected is 370 with none excluded.

Table 4.2: Reliability Statistics

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha based on Standardized Items	N of Items
.881	.881	11

The reliability statistics tables show Cronbach's Alpha value and the number of items (N). The total number of independent variables is 9. The Cronbach's Alpha shows the consistency level in data that has been collected. As explained by Nawi et al. (2020), the Cronbach's Alpha value must measure to a range in order to become acceptable.

Table 4.3: Cronbach Alpha Test

Alpha Coefficient Range	Strength of Association
< 0.6	Poor and Not Acceptable
0.6 to < 0.7	Moderate and Acceptable
0.7 to < 0.8	Good
0.8 to < 0.9	Very Good
0.9 >	Excellent

The Cronbach's Alpha value shows 0.922 which indicates the reliability test is excellent, demonstrating high level of consistency.

Table 4.4: Mean and Standard Deviation Values for Independent Variables

Item Statistics

	Mean	Std. Deviation	N
Perceived Ease of Use	4.55	.716	370
Intention to Use	4.69	.652	370
Perceived Satisfaction	4.67	.615	370
E-Learning Self Efficacy	3.93	.685	370
Perceived Barriers	4.60	.665	370
Perceived Usefulness	4.67	.659	370
Technology Skills	4.63	.643	370
Perceived Instructor Quality	3.92	.690	370
Perceived Cost	4.68	.663	370
Instructional Environment	3.91	.825	370
Learning Styles	4.56	.735	370

The Item statistics table shows the mean and standard deviation values for each of the independent variables, as well as the total number of data that was collected.

Table 4.5: Correlation Analysis of Variables

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Perceived Ease of Use	44.26	21.302	.663	.866
Intention to Use	44.12	21.184	.765	.860
Perceived Satisfaction	44.14	21.514	.755	.861
E-Learning Self Efficacy	44.88	21.739	.625	.869
Perceived Barriers	44.21	21.377	.713	.863
Perceived Usefulness	44.14	21.212	.751	.861
Technology Skills	44.18	21.646	.692	.865
Perceived Instructor Quality	44.89	21.743	.619	.869
Perceived Cost	44.13	21.148	.756	.860

Instructional Environment	44.90	24.012	.187	.901
Learning Styles	44.25	24.158	.208	.896

The Item total statistics table shows a list of values including, Scale Mean if Item Deleted, Scale Variance if Item Deleted Corrected, Item-Total Correlation and Squared Multiple Correlation. This distribution is very close which signifies a high level of consistency. In addition, the Cronbach's alpha value for each independent variable is given in the table as well.

4.3   Descriptive Analysis

The descriptive analysis is usually used to explain and describe the basic features of a study in which it gives a summary about a sample population and its measures. It aids the researcher to explain what the data shows or implies. The descriptive statistics and analysis in this case, consists of the combination of a table and bar charts that displays statistical analysis from the data as well as pie charts showing percentage distribution. This is classified into demography distribution and construct distribution.

4.3.1   Demography Distribution

For the demography distribution, the following criteria have been used to segment the data: Age, Sex, Class (Level) and Exact University.

Figure 4.1: Age Distribution of Respondents
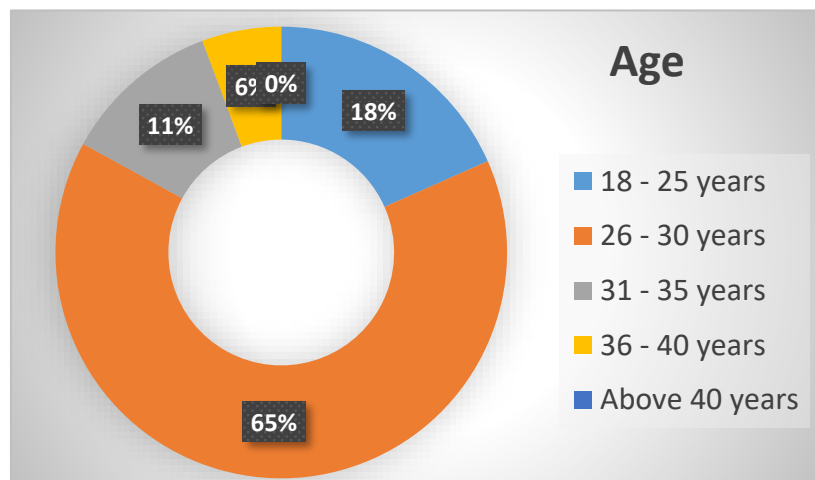
Pie chart shows age distribution of the total correspondents, around 65% falls between 26 to 30 years of age.
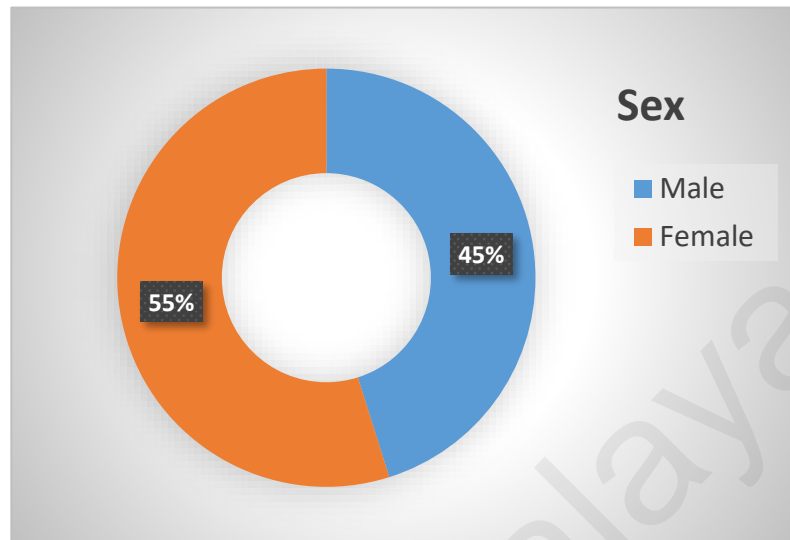

Figure 4.2: Gender Distribution of Respondents

About 55% of total correspondents are female, this means the opinion is a female oriented opinion, as compared to male population that makes up the remaining 45%.
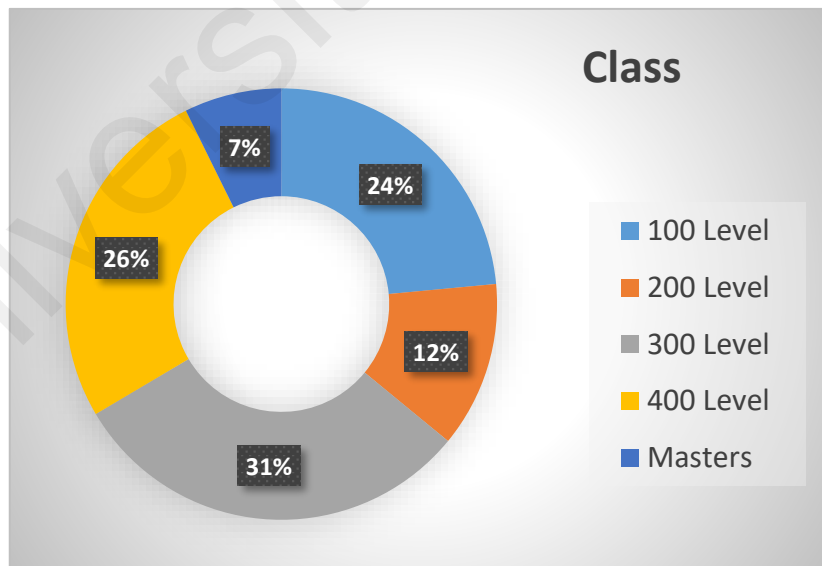
Figure 4.3: Distribution of Respondents across Levels

The distribution of students cuts across all level, but students in 300 level across the 4 university make up about 31% of total correspondents. This is followed by 400 Level students across the universities.
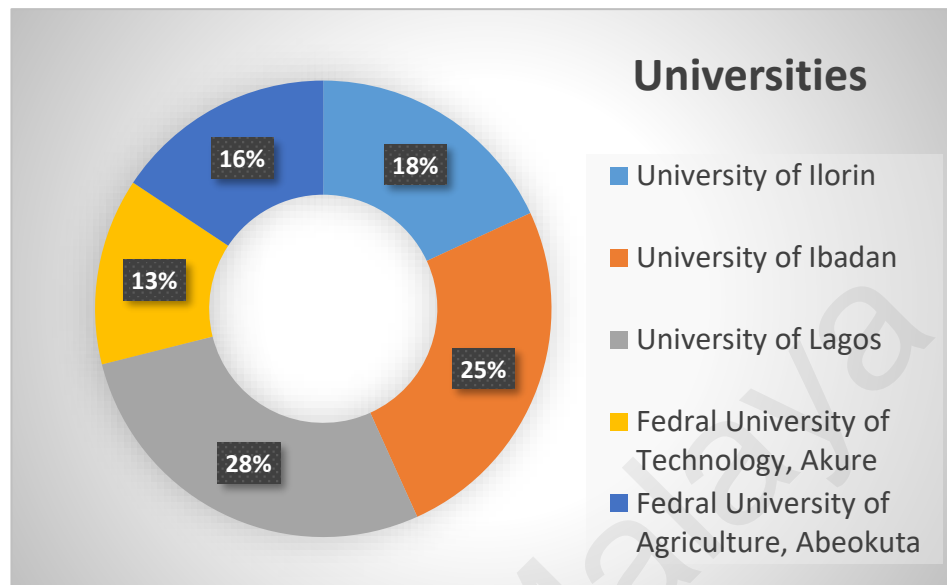
Figure 4.4: Distribution of Respondents across Universities

A consideration of the distribution shows that there are more students from University of Lagos and Ibadan; this means most of the feedback may be influenced by opinions from the two universities.

4.3.2 Independent Variables

This shows the frequency distribution of the independent variables. This is given below.

Table 4.6: Frequency Distribution of Independent Variables

	Statistics						
	Valid (N)	Missing	Mean	St. Dev.	Var.	Min.	Max.
PEOU	370	0	4.55	.716	.513	3	5
ITU	370	0	4.69	.652	.425	3	5
PS	370	0	4.67	.615	.379	3	5
ELSE	370	0	3.93	.685	.442	3	5
PB	370	0	4.60	.665	.442	3	5
PU	370	0	4.67	.659	.434	3	5

TS	370	0	4.63	.643	.413	3	5
PIC	370	0	3.92	.690	.477	3	5
PC	370	0	4.68	.663	.440	3	5
ELA	370	0	4.16	.663	.333	1	5
IE	370	0	3.91	.825	.680	2	5
LS	370	0	4.56	.735	.540	2	5

Table 4.7: Frequency Distribution of PEU

Perceived Ease of Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	49	13.2	13.2	13.2
	Agree	67	18.1	18.1	31.4
	Strongly Agree	254	68.6	68.6	100.0
	Total	370	100.0	100.0	
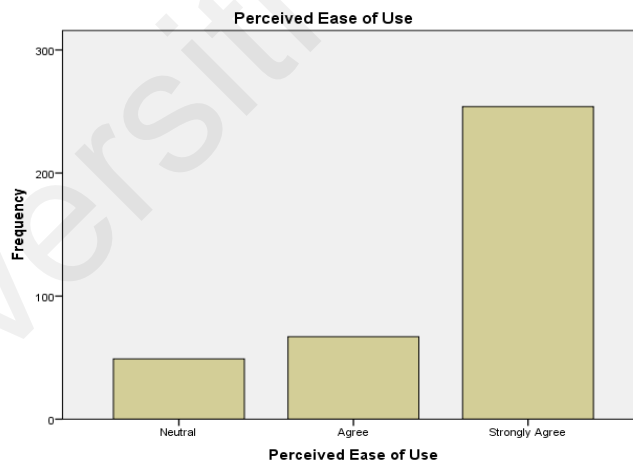
Figure 4.5: Bar Chart Showing the Frequency of PEU

89
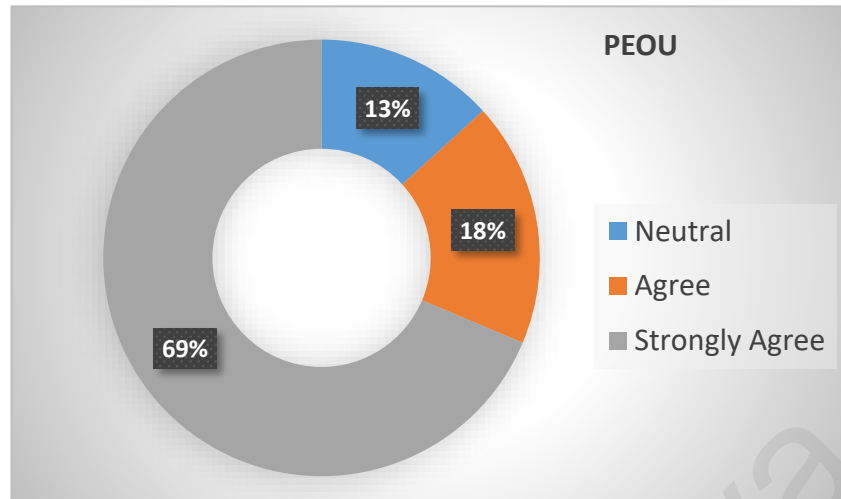
Figure 4.6: Descriptive Analysis of PU

About 87% of total correspondents agree and strongly agree with perceived ease of use when it comes to E-learning. This also means and indicates that the, interaction with e-learning is clear and understandable, coupled with the fact that it does not require a lot of mental effort. This also means the correspondents find E-Learning easy to use as well as the environment.

Table 4.8: Frequency Distribution of ITU

Intention to Use

|		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	39	10.5	10.5	10.5
	Agree	36	9.7	9.7	20.3
	Strongly Agree	295	79.7	79.7	100.0
	Total	370	100.0	100.0	
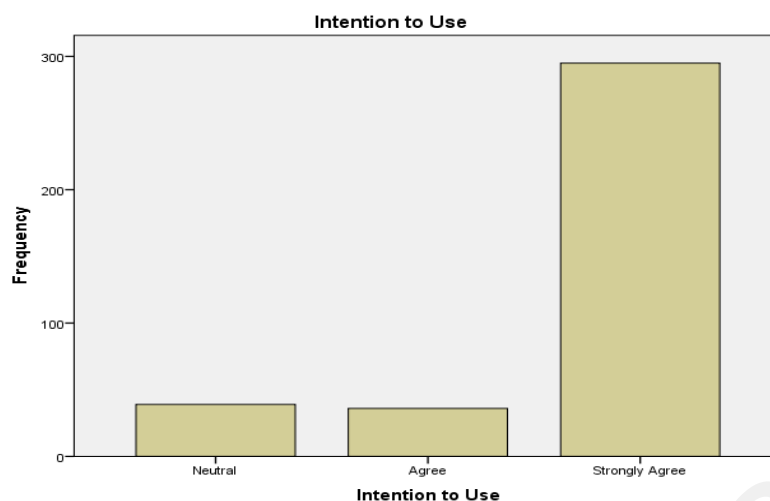
Figure 4.7: Bar Chart Showing Frequency of ITU

Figure 4.8: Descriptive Analysis of ITU

About 90% of total correspondents agree and strongly agree to the fact that they will use E-learning if they have access to it now or in the future.

Table 4.9: Frequency Distribution of PS

Perceived Satisfaction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	29	7.8	7.8	7.8
	Agree	64	17.3	17.3	25.1
	Strongly Agree	277	74.9	74.9	100.0
	Total	370	100.0	100.0	
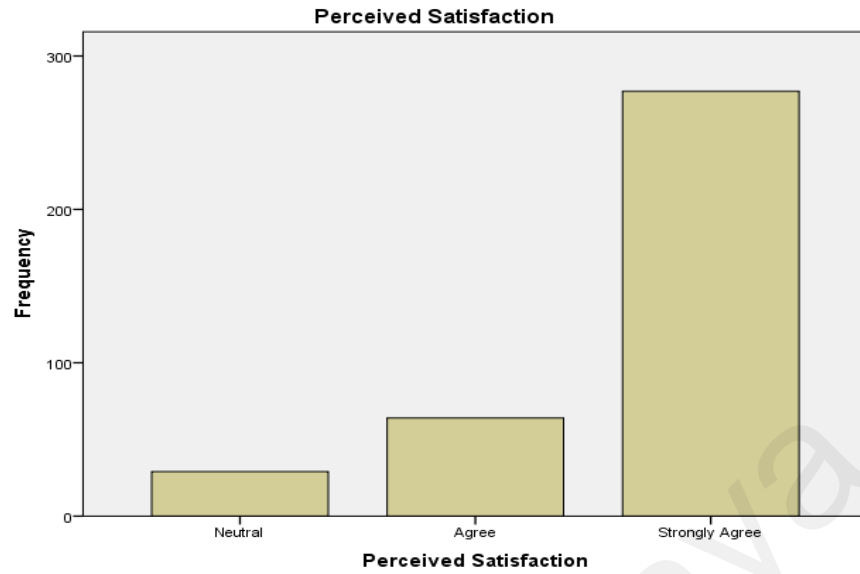
Figure 4.9: Bar chart showing descriptive analysis of ITU
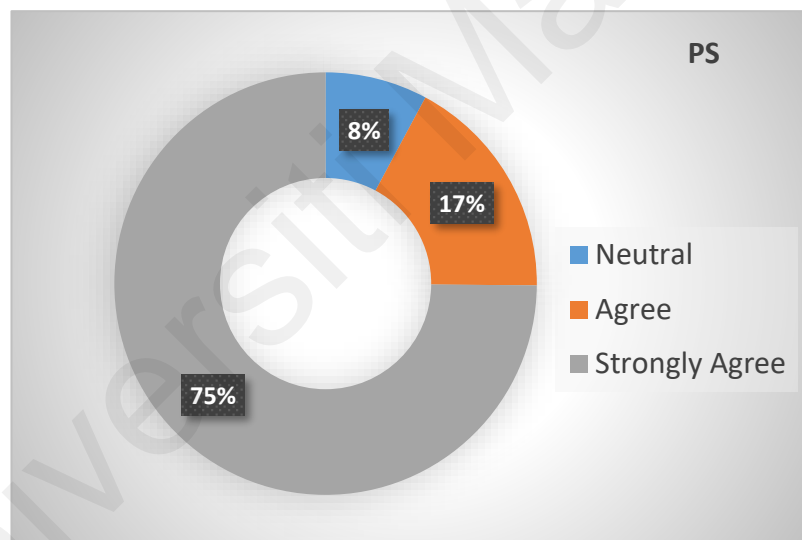
Figure 4.10: Descriptive Analysis of PS

About 92% of total correspondents agree and strongly agree to the fact that they are and will be satisfied with E-learning technology, the efficiency of the technology as well as effectiveness of the technology.

Figure 4.11: Frequency Distribution of ESE

E-Learning Self Efficacy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	100	27.0	27.0	27.0
	Agree	195	52.7	52.7	79.7
	Strongly Agree	75	20.3	20.3	100.0
	Total	370	100.0	100.0	

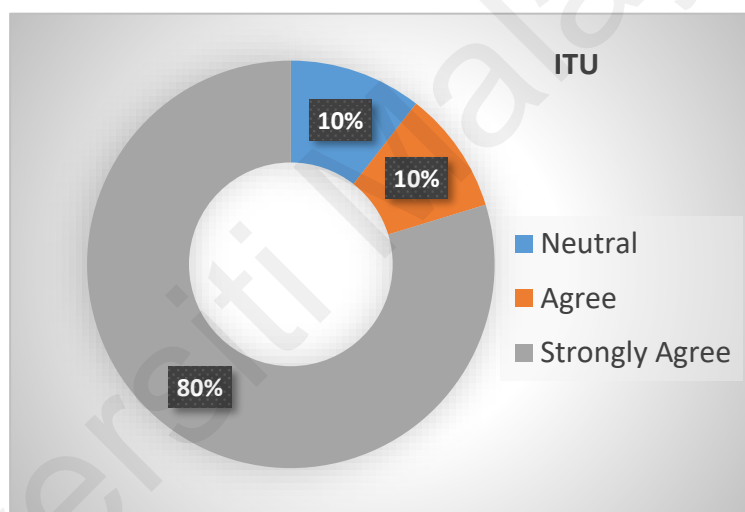**Figure 4.12: Bar Chart Showing Descriptive Analysis of ESE**

Figure 4.13: Descriptive Analysis of ESE

About 73% of total correspondents agree and strongly agree to the fact that they can use the E-learning technology without instructions, without ever using an information system of such and even if there is no assistant illustration tool to further assist.

Table 4.10: Frequency Distribution of PB

Perceived Barriers

|		Frequency	Percent	Valid Percent	Cumulative Percent
	Neutral	37	10.0	10.0	10.0
Valid	Disagree	75	20.3	20.3	30.3
	Strongly Disagree	258	69.7	69.7	100.0
	Total	370	100.0	100.0	
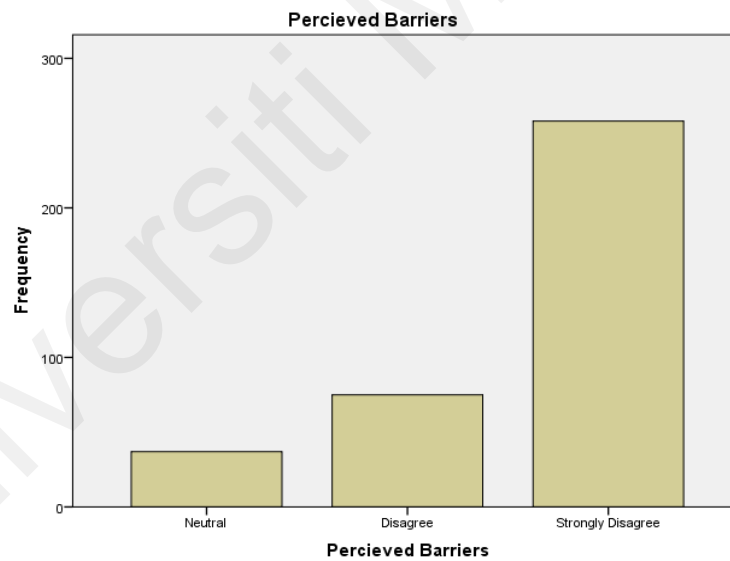
Figure 4.14: Bar Chart Showing Descriptive Analysis of PB
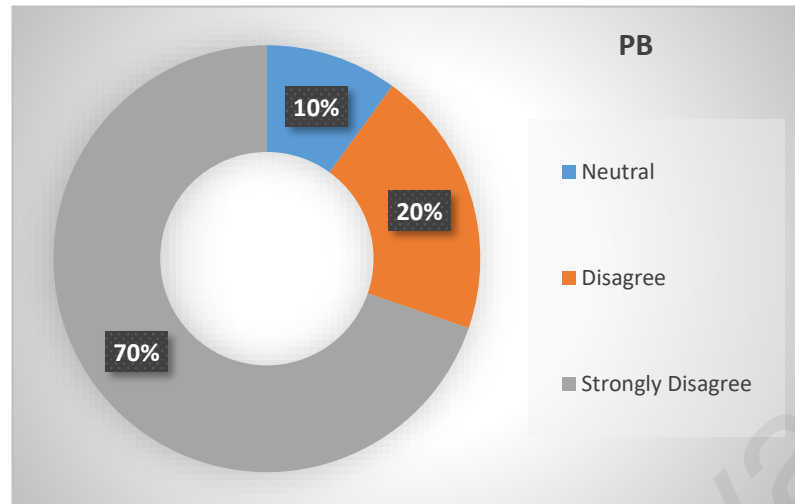
Figure 4.15: Descriptive Analysis of PB

About 90% of total correspondents disagree and strongly disagree to the fact that it's difficult for them to cope with using E-learning technologies or that they encounter difficulties in using e-learning for studies and it affects the way they use the technology.

Table 4.11: Frequency Distribution of PU

Perceived Usefulness

		Frequency	Percent	Valid Percent	Cumulative Percent
	Neutral	39	10.5	10.5	10.5
Valid	Agree	45	12.2	12.2	22.7
	Strongly Agree	286	77.3	77.3	100.0
	Total	370	100.0	100.0	
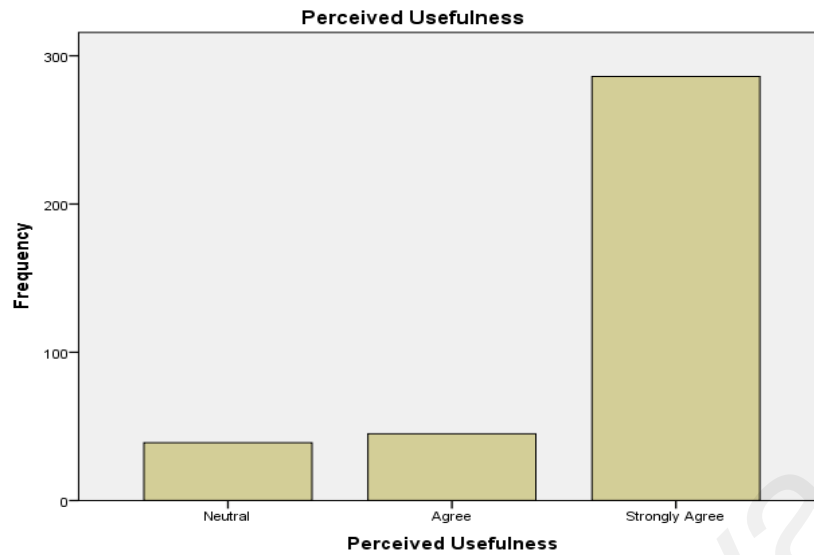
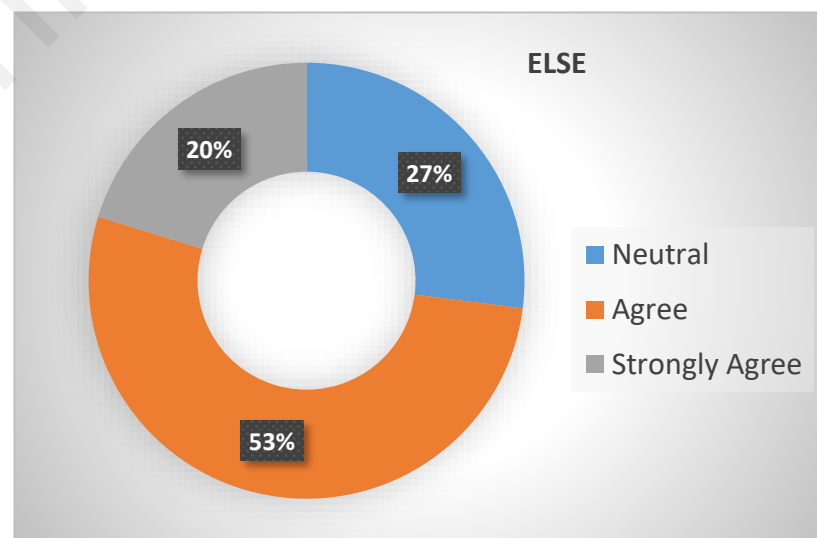**Figure 4.16: Bar Chart Showing Descriptive Analysis of PU**

Figure 4.17: Descriptive Analysis of PU

About 91% of total correspondents agree and strongly agree to the fact that the use of E-learning will improve student academic performance, increase student performance in computer science studies and enhance student's learning effectiveness.

Table 4.12: Frequency Distribution of TS

Technologic Skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	33	8.9	8.9	8.9
	Agree	72	19.5	19.5	28.4

|				
Strongly Agree	265	71.6	71.6	100.0
Total	370	100.0	100.0	
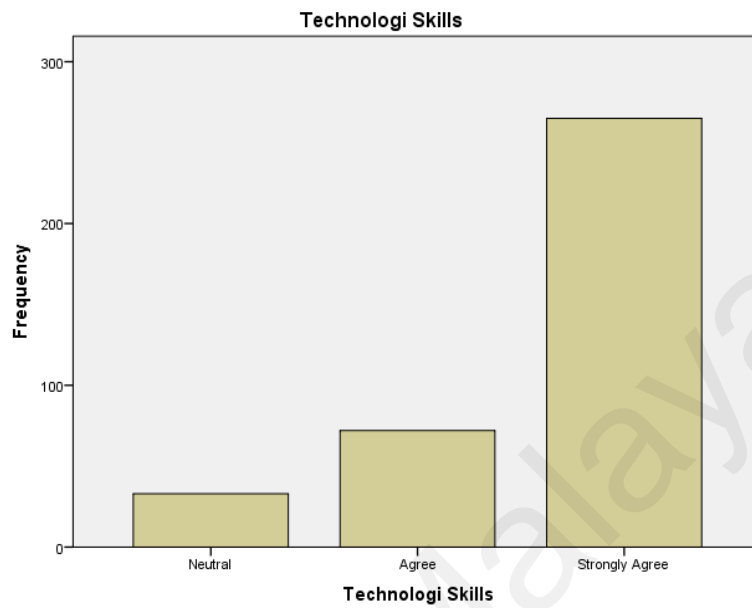
Figure 4.18: Bar Chart Showing Descriptive Analysis of TS
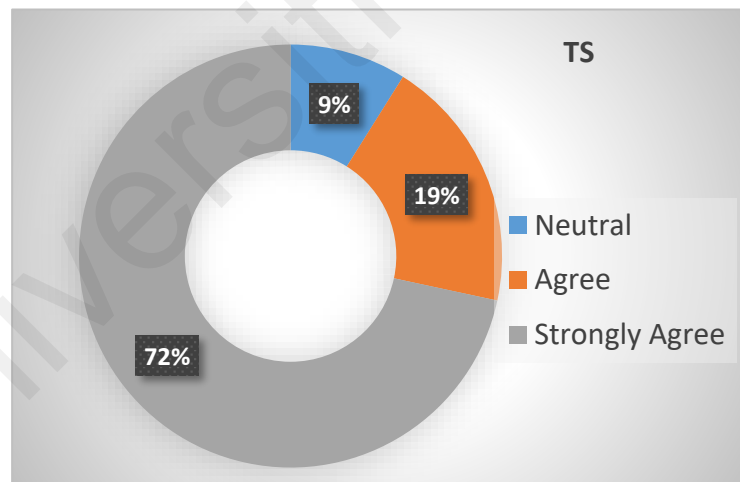
Figure 4.19: Descriptive Analysis of TS

About 91% of total correspondents agree and strongly agree to the fact that student's technological skills will affect the use of E-learning but will feel comfortable to use e-learning because of the technological skills.

Table 4.13: Frequency Distribution of PIQ

Perceived Instructor Quality

|		Frequency	Percent	Valid Percent	Cumulative Percent
	Neutral	103	27.8	27.8	27.8
	Agree	192	51.9	51.9	79.7
Valid	Strongly Agree	75	20.3	20.3	100.0
	Total	370	100.0	100.0	
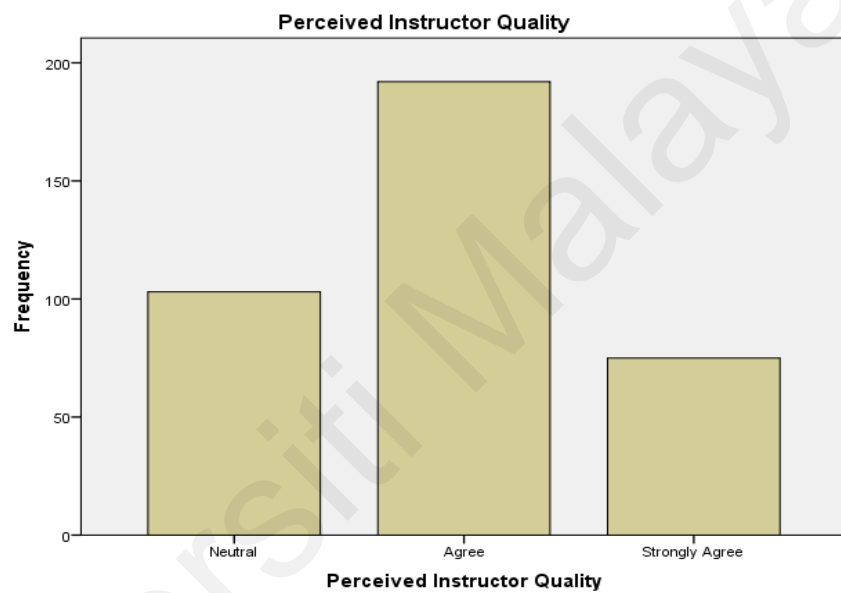
Figure 4.20: Bar Chart Showing Descriptive Analysis of PIQ
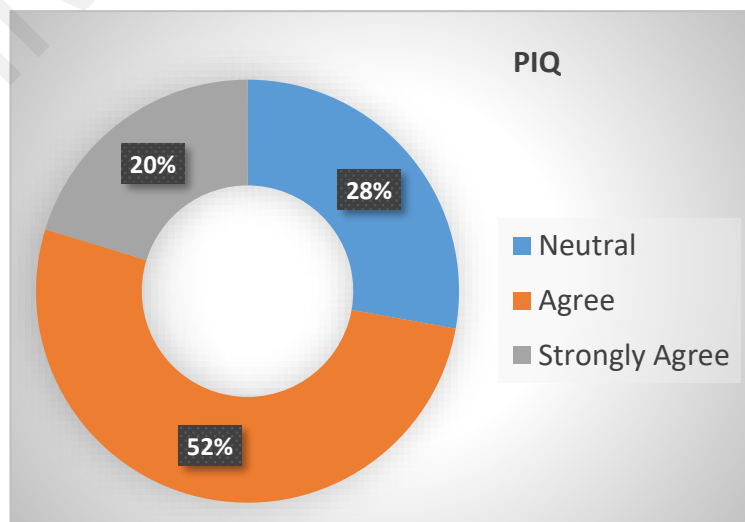
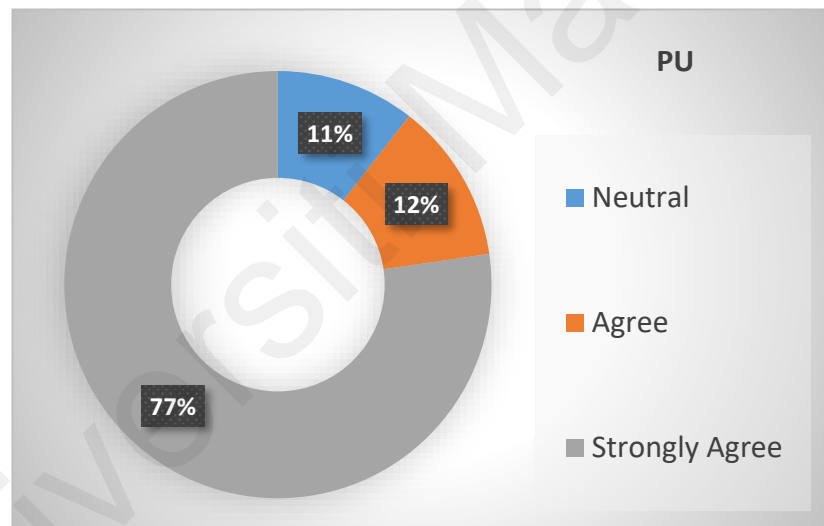**Figure 4.21: Descriptive Analysis of PIQ**

About 73% of total correspondents agree and strongly agree to the fact that the effectiveness of the instructor will affect the student's use of e-learning technology, the efficiency of the instructor will impact the student's use of e-learning technology as well as the qualities of the instructor will have impact on the student's use of e-learning technology.

Table 4.14: Frequency Distribution of PC

Perceived Cost

|		Frequency	Percent	Valid Percent	Cumulative Percent
	Neutral	41	11.1	11.1	11.1
	Disagree	36	9.7	9.7	20.8
Valid	Strongly Disagree	293	79.2	79.2	100.0
	Total	370	100.0	100.0	
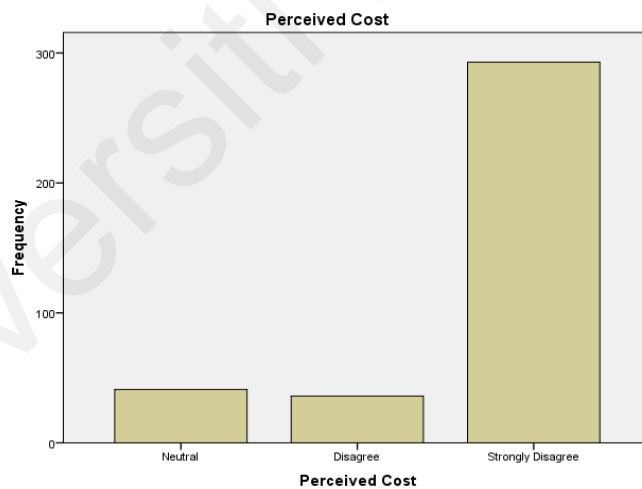
Figure 4.22: Bar Chart Showing Descriptive Analysis of PC

Figure 4.23: Descriptive Analysis of PC

About 89% of total correspondents disagree and strongly disagree to the fact that the cost of using e-learning technology will affect how students use it. This means the cost does not in any way relate to the way the technology will be used or utilized by the students.

Table 4.15: Frequency Distribution of IE

Instructional Environment

		Frequency	Percent	Valid Percent	Cumulative Percent
	Disagree	36	9.7	9.7	9.7
	Neutral	36	9.7	9.7	19.5
Valid	Agree	224	60.5	60.5	80.0
	Strongly Agree	74	20.0	20.0	100.0
	Total	370	100.0	100.0	
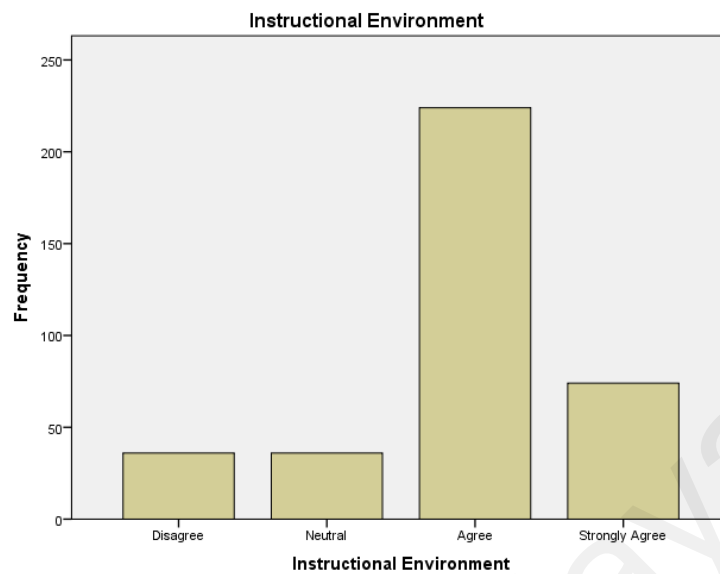
Figure 4.24: Bar Chart Showing Descriptive Analysis of IE
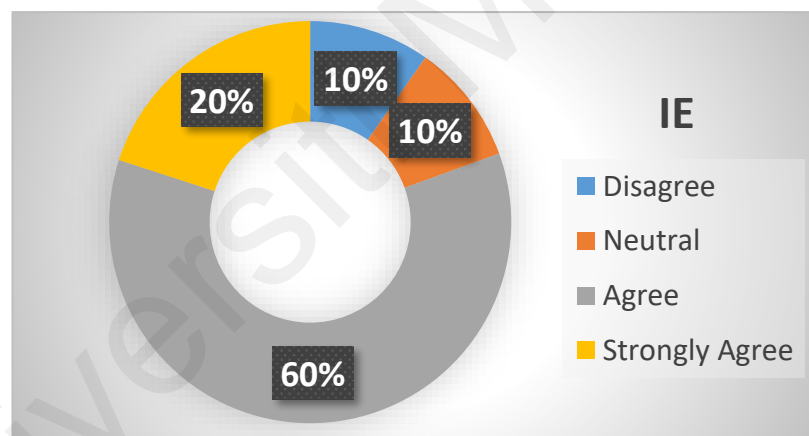
Figure 4.25: Descriptive Analysis of IE

About 80% agree and strongly agree to the fact that Instructional Environment will affect how students use of e-learning technology. This further means that Instructional Environment will significantly affect use of e-learning technology.

Table 4.16: Frequency Distribution of LS

Learning Style

|		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	18	4.9	4.9	4.9
	Agree	110	29.7	29.7	34.6
	Strongly Agree	242	65.4	65.4	100.0
	Total	370	100.0	100.0	
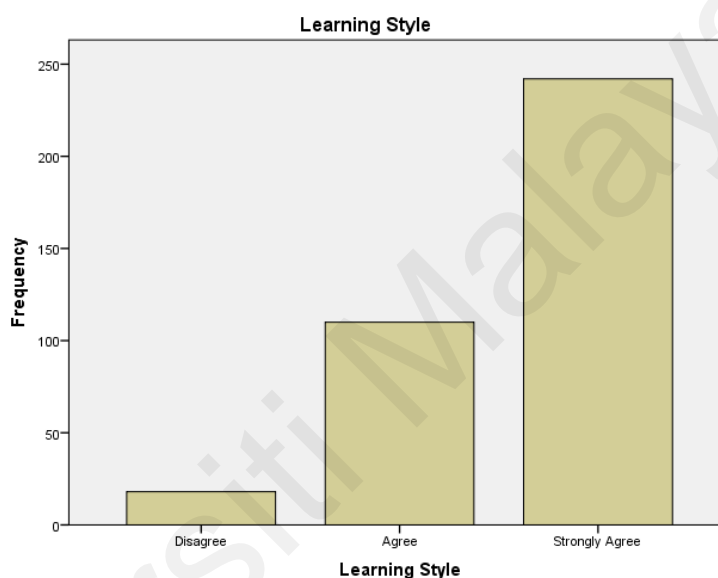
Figure 4.26: Bar Chart Showing Descriptive Analysis of LS
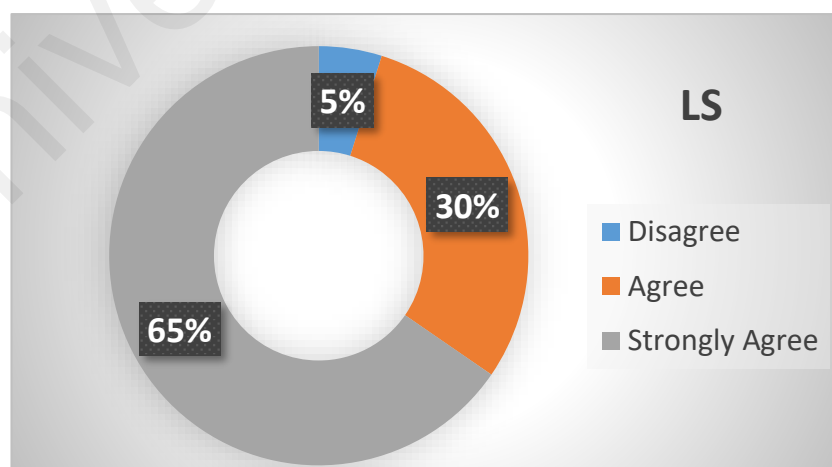
Figure 4.27: Descriptive Analysis of LS

About 95% of the total correspondence agree and strongly agree to the fact that the learning styles can significantly affect the use of e-learning technology.
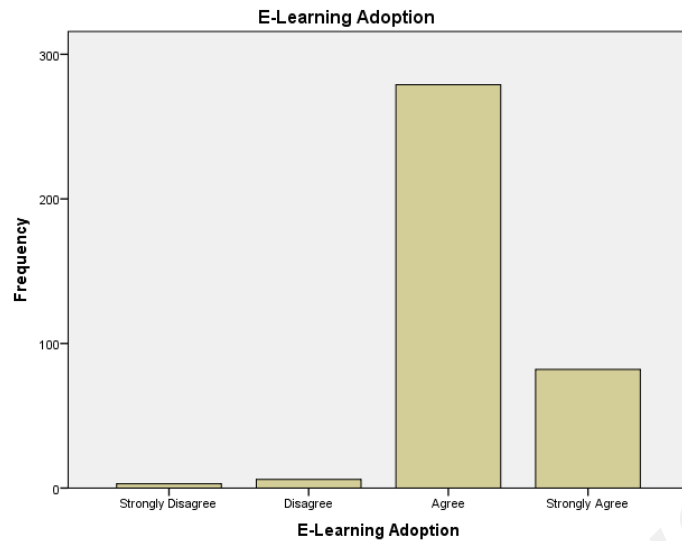
Figure 4.28: Bar Chart Showing Descriptive Analysis of ELA

Table 4.17: Frequency of E-learning Adoption

E-Learning Adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	.8	.8	.8
	Disagree	6	1.6	1.6	2.4
	Agree	279	75.4	75.4	77.8
	Strongly Agree	82	22.2	22.2	100.0
	Total	370	100.0	100.0	

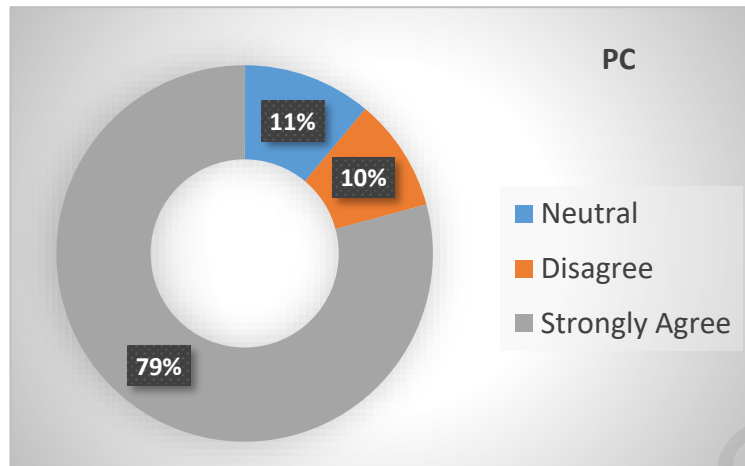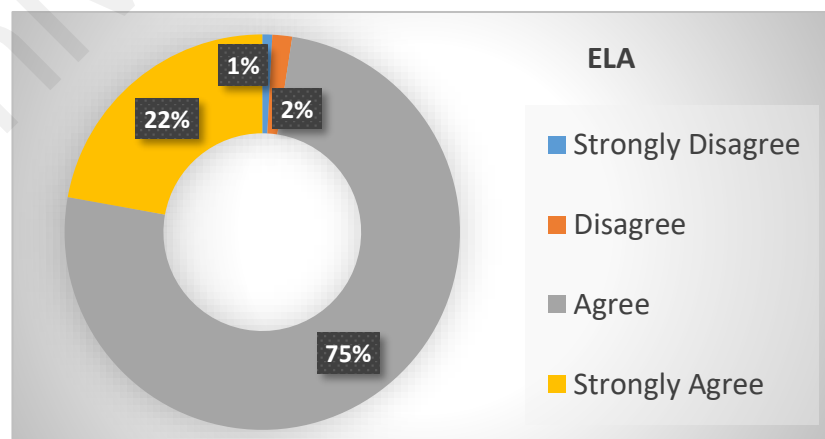**Figure 4.29: Descriptive Analysis of ELA**

About 97% of total correspondents agree and strongly agree to the fact that E-learning adoption should take place in institutions across the South-Western part of Nigeria. This might be an indication that it is an extension of the whole country. This is because the result obtained is based on the survey carried out in that part of the country.

4.4 Regression Analysis (Answering Rq1)

The regression analysis is used to determine if there is a relationship between the factors that affect E-learning adoption in tertiary institutions. The factors make up the independent variables while e-learning adoption becomes the dependent variable. This will further help in answering research question (RQ1) which is: factors affecting students' e-learning adoption in tertiary institutions within Southwest Nigeria?

Table 4.18: Regression Analysis of Factors Affecting E-learning Adoption

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Perceived Cost, Perceived Instructor . Quality, Technologic Skills, Perceived Ease of Use, Perceived Barriers, Perceived Satisfaction, Perceived Usefulness, Intention to Use, E-Learning Self Efficacy		Enter

a. Dependent Variable: E-Learning Adoption

b. All requested variables entered.

The table above shows the independent variables and dependent variable that that have been tested against each other.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1
1	.228[a]	.052	.028	.569	.052	2.189	9

Table 4.20: Model Summary

Model Summary

Model	Change Statistics df2	Sig. F Change
1	360[a]	.000

a. Predictors: (Constant), Perceived Cost, Perceived Instructor Quality, Technologic Skills, Perceived Ease of Use, Perceived Barriers, Perceived Satisfaction, Perceived Usefulness, Intention to Use, E-Learning Self Efficacy.

In the Model Summary, the most important figure is the significance value. The significance level shows if the regression analysis value is significant. In order to determine that, the value needs to be taken into consideration. For the value to be significant, it has to be between 0.00 and 0.05. Any value over 0.05 is not significant but that does not rule out the relationship between the dependent and independent variables. The significance level in the tables shows a value of 0.022.

Table 4.21: Model Coefficient of Variables

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		

(Constant)	3.155	.293			10.759	.000
Perceived Ease of Use	.057	.080	.071	.714	.048
Intention to Use	.505	.280	.570	1.806	.032
Perceived Satisfaction	-.248	.127	-.265	-1.959	.051
E-Learning Self Efficacy	-.087	.323	-.103	-.269	.048
Perceived Barriers	-.026	.098	-.030	-.262	.019
Perceived Usefulness	-.329	.186	-.375	-1.764	.028
Technologic Skills	-.033	.106	-.037	-.312	.756
Perceived Instructor Quality	.153	.319	.183	.479	.063
Perceived Cost	-.014	.204	-.017	-.071	.059
Instructional Environment	.043	.039	.061	1.080	.028
Learning Style	.216	.041	.276	5.329	.010

a. Dependent Variable: E-Learning Adoption

This has been able to successfully establish if there is any form of relationship between the independent variables (factors that affect E-learning adoption in tertiary institutions), as well as the dependent variables (E-learning adoption in tertiary institutions). With this, the research questions (RQ1) have been successfully answered.

4.5   Correlation Analysis (Answering Rq2)

Correlation analysis is undertaken in order to establish whether there is a relationship in the form of influence of mediating variable effect on the factors that have a substantial impact on the adoption of e-learning (ELA). There are two mediating variables that have been used in the test, these are Instructional Environment as well as Learning Style. The correlation will help answer the research question: What impact do the moderating factors have on e-learning adoption for students in tertiary institutions within Southwest Nigeria? This is illustrated in the next subsections.

4.5.1 Instructional Environment

For the instructional environment, the relationship between the factors influencing the adoption of E-learning in tertiary institutions and the adoption of E-learning itself was examined using a bivariate correlation. For correlation, two values are important, the Pearson correlation and the significance value. For Pearson correlation the expected value should be between -1.0 to 1.0. Any value that falls outside this also means there is no relationship. The significance value indicates if the correlation values are significant. In this case, the significance values is important in establishing the fact that the mediating variable can impact the relationship between the factors affecting E-learning adoption in tertiary institutions, and E-learning adoption. This is demonstrated in Table 4.22 below.

Table 4.22: Pearson Correlation Analysis of Construct Variables and IE

Factors	N	Mean	Std. Dev.	PC	Sig
PEOU	370	4.56	.716	-.079	.131
ITU	370	4.69	.652	.255**	.000
PS	370	4.67	.615	.132*	.011
ELSE	370	3.93	.685	.205**	.000
PB	370	4.60	.665	-.078	.136
PU	370	4.67	.659	.263**	.000
TS	370	4.63	.643	.135**	.010
PIC	370	3.92	.690	.202**	.000
PC	370	4.68	.663	.258**	.000

Considering the significance values, PEOU and PB both have values of .131 and .136 respectively which shows that the two are not in any way impacted by the mediating variable of instruction environment. However, ITU, PS, ELSE, OU, TS, PIC ad PC all shows values less than .05 which implies significance. This also means that they are all impacted by the mediating variable of instruction environment, taking into consideration,

the relationship between the factors affecting E-learning adoption in tertiary institutions, and E-learning adoption.

4.5.2 Learning Styles

To see if the learning style has a moderating influence on the link between the factors influencing e-learning adoption at tertiary institutions and e-learning adoption itself, a bivariate correlation was conducted for this variable. The result is demonstrated in Table 4.23.

Table 4.23: Pearson Correlation Analysis of Construct Variables and LS

Factors	N	Mean	Std. Dev.	PC	Sig
PEOU	370	4.56	.716	.179**	.001
ITU	370	4.69	.652	.133*	.011
PS	370	4.67	.615	.269**	.000
ELSE	370	3.93	.685	.075	.151
PB	370	4.60	.665	.194**	.000
PU	370	4.67	.659	.137**	.008
TS	370	4.63	.643	.234**	.000
PIC	370	3.92	.690	.078	.135
PC	370	4.68	.663	.143**	.006

In the table above, the significance values of E-Learning Self Efficacy (ELSE) and Perceived Instructor Quality (PIC) shows .151 and .135 respectively which shows there is no significance. This also indicates that the mediating variable of learning style does not in any way impact the relationship between the factors affecting E-learning adoption in tertiary institutions, and E-learning adoption. Further examination shows that Perceived Ease of Use (PEOU), Intention to Use (ITU), Perceived Satisfaction (PS), Perceived Barriers (PB), Perceived Usefulness (PU), Technological Skills (TS) and Perceived Cost (PC), obtained significance values .001, .011, .000, .000, .008, .000 and .006 respectively, thus indicating that the mediating variable of learning style can impact

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the relationship between the factors affecting E-learning adoption in tertiary institutions, and E-learning adoption.

In view of this, the Pearson correlation results have been able to answer research question (RQ2).

4.6   Hypothesis Testing (Answering Rq3)

The hypothesis testing is described as a formal procedure for investigating an idea about a study using statistics (Bevans, 2021). It usually involves formulating the research hypothesis, collection of data and statistical test performance to determine and decide whether to reject or not. The research question to be answered is: What e-learning adoption model can be developed and validated in tertiary institutions within Southwest Nigeria?

The hypothesis analysis is obtained from the regression analysis that has been done, the results shows that 8 out of total 11 variables are influenced by the mediating variable, which are instruction environment and learning styles. The result further implies that only 8 of total nine variables actually have significant relationship with the independent variable which is E-learning adoption. This is presented in Table 4.24.

Table 4.24: Hypotheses Testing

SN	Hypothesis	Significance	Status	Relationship
H1	Perceived Ease of Use	.048	Not Supported	Strong
H2	Intention to Use	.032	Supported	Strong
H3	Perceived Satisfaction	.051	Not Supported	Weak
H4	E-Learning Self Efficacy	.048	Supported	Strong
H5	Perceived Barriers	.019	Supported	Strong
H6	Perceived Usefulness	.028	Supported	Very Strong

SN	Hypothesis		Significance	Status	Relationship
H7	Technologic Skills		.035	Supported	Strong
H8	Perceived Instructor Quality		.063	Not Supported	Weak
H9	Perceived Ease of Use		.059	Not Supported	Weak
H10	Instructional Environment		.028	Supported	Very Strong
H11	Learning Style		.010	Supported	Very Strong

Based on this, a new model can be constructed which takes into consideration the supported hypothesis as presented in Table 4.25 below.

Table 4.25: Significant Model Construct

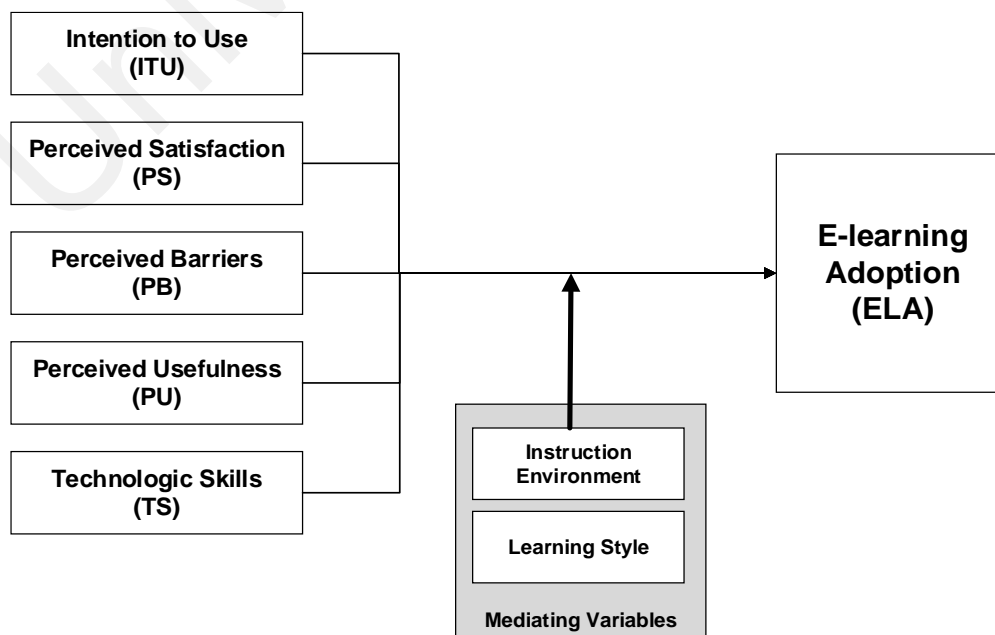| SN	Hypothesis	Significance	Status	Relationship
H2	Intention to Use	.021	Supported	Very Strong
H3	Perceived Satisfaction	.040	Supported	Strong
H5	Perceived Barriers	.036	Supported	Strong
H6	Perceived Usefulness	.016	Supported	Very Strong
H7	Technologic Skills	.046	Supported	Strong

Figure 4.30: Proposed ELA Model

The diagram in Figure 4.30 depicts the new model based on the outcome of the analysis conducted to actually show where there is actual relationship between the independent variables and the dependent variable.

CHAPTER 5: RECOMMENDATION AND CONCLUSION

5.1   Preamble

The recommendation and discussion is an important part of the research because it gives the research the chance to reflect on what has been done, including the examination and evaluation of the milestones that has been set from the initial stage of the research, the objectives that have been outlined at the beginning of the research, the result from the data that has been collected and analysed as well as the evaluation of the research hypothesis that was formulated at the beginning of the research. It becomes important to evaluate each individual criterion. Based on this, a recommendation and conclusion are given.

5.2   Evaluation

An evaluation of the aims and objectives of the research is important in order to know if the research has been able to achieve its aim.

5.2.1   Objectives

An overview of the objectives that has been set is necessary at this point in time. This are given below:

- To identify factors affecting students' E-learning adoption in tertiary institutions;
- To investigate the moderating factors of E-learning adoption for students in tertiary institutions and
- To develop and validate an E-learning adoption model for students in tertiary institutions.

All the three objectives have been achieved in the course of executing the research. It also becomes necessary to evaluate the hypotheses that have been formulated.

5.2.2 Hypothesis

In order to be able to achieve this part of the objectives of the research, the hypothesis formulated have been tested statistically to establish defined patterns that confirms if the hypotheses are true or not. An overview of the formulated hypotheses are given below:

H₁: There is a moderating effect of instructional environment and learning styles on the relationship between student's Perceived ease of use (PEOU) and E-learning Adoption (ELA).

H₂: There is a moderating effect of instructional environment variables and learning styles on the relationship between student's Intention to Use (ITU) and E-learning Adoption (ELA).

H3: There is a moderating effect of instructional environment and learning styles on the relationship between student's Perceived Satisfaction (PS) and E-learning Adoption (ELA).

H4: There is a moderating effect of instructional environment and learning styles on the relationship between student's E-learning self-efficacy (ELSE) and E-learning Adoption (ELA).

H5: There is a moderating effect of instructional environment and learning styles on the relationship between student's Perceived Barriers (PB) and E-learning Adoption (ELA).

H6: There is a moderating effect of instructional environment and learning styles on the relationship between student's Perceived Usefulness (PU) and E-learning Adoption (ELA).

H7: There is a moderating effect of instructional environment and learning styles on the relationship between student's Technological Skills (TS) and E-learning Adoption (ELA)

H8: There is a moderating effect of instructional environment and learning styles on the relationship between student's Perceived Instructor Quality (PIQ) and E-learning Adoption (ELA).

H9b: There is a moderating effect of instructional environment and learning styles on relationship between student's Perceived Cost (PC) and E-learning Adoption (ELA).

From the analysis carried out in the previous chapter, it shows and indicates that the formulated hypothesis has all been achieved, although with different outcomes. This is further discussed in the discussion part before a recommendation is eventually given.

5.3   Discussion

The discussion takes into consideration the major highlights of the analysis performed and the impact and effect of the results that have been obtained. The objectives and research hypothesis has set the precedence for the kind of result the research is hoping to get. In the area dealing with the reliability of the data that has been collected, there is no doubt that the value shows very high level of consistency, so the issue of data consistency is already sorted out. However, highlights and emphasis are placed on the descriptive analysis, regression and the hypothesis testing.

In the aspect of Perceived Ease of use, bar chart representation shows that about 87% of total correspondents agree and strongly agree with perceived ease of use when it comes to E-learning, which signifies that interaction with e-learning is crystal clear and simple enough for comprehension and it does not require a lot of mental effort. Statistically from regression analysis, a significance value of 0.094 is given; the hypothesis is not supported and has a weak relationship with E-Learning Adoption. In the aspect of E-Learning and Self Efficacy, bar chart representation shows about 73% of total correspondents agree and strongly agree to the fact that they can use the E-learning technology without instructions, even though they haven't used any system of such. Statistically from regression analysis, a significance value of 0.067 is given, the hypothesis is not supported but shows a strong relationship with E-Learning Adoption. In the aspect of Perceived Instructor Quality, bar chart representation shows about 73% of total correspondents agree and strongly agree to

the fact that effectiveness and efficiency of the instructor will affect the student's use of e-learning technology. With regression analysis, a significance value of 0.054 is obtained which shows that even though it is not supported, it still displays a very strong relationship with E-Learning Adoption.

When it comes to Perceived Cost, bar chart representation shows about 89% of total correspondents disagree and strongly disagree to the fact that the cost of using e-learning technology will affect how students use it. Regression analysis shows that, a significance value of 0.070 is obtained, which indicates that it is not supported but still displays a moderately strong relationship. In consideration of other aspects such as Intention to Use, Perceived Satisfaction, Perceived Barriers, Perceived Usefulness, as well as Technologic Skills, both bar chart representation and the regression analysis results all shows that the hypothesis are supported. In view of this, 5 variables of the total 9 both shows in form of chart and statistical data obtained that the hypothesis that has formulated the variables are supported and displays a strong relationship. The remaining 4 variables that are not supported but still shows a reasonable level of strength of relationship, indicates that sometimes statistical output may not be a true reflection of the reality. An overall consideration shows that all the variables have a level and strength of relationship with E-Learning Adoption. The reality of this is that when adoption of E-learning is to be integrated, it becomes important to consider all the variables, but the level of relationship and strength is now subjected to the environment in which it is to be integrated.

5.4 Recommendation

This research have been able to establish the relationships between Perceived Ease of Use, Intention to Use, Perceived Satisfaction, E-Learning Self Efficacy, Perceived Barriers, Perceived Usefulness Technologic Skills, Perceived Instructor Quality as well as Perceived Cost and E-learning Adoption. Thus, results obtained shows that it is

adoptable in higher institutions most especially in the South-Western part of Nigeria. E-Learning has become a technology that has been integrated into educational industry worldwide and has been able to help millions of people access world class education from the comfort of their respective homes in different locations. It has also been able to change the way educational institutions interact with international students worldwide as it has made them more accessible and available. The benefits of this kind of technology should be integrated into the Nigeria educational sector in order to become more flexible, enhance learning opportunities and furthermore reduce physical contact, especially in recent times where the pandemic has affected the way we live our everyday lives, with limited physical access to people across the world in order to curb the spread. E-Learning technology can become handy in this kind of situation that is already beyond the world control.

5.5   Future Research

Whenever research is conducted, it is done based on a perspective which does not represent a whole picture of the domain area. There are different areas that can be of interest in terms of more research. This research is focused on E-learning adoption, an area of interest can be to focus on developing the technology itself, to cater for a specific target population. Although there are already different types of E-Learning technology across the world, integrated in different institutions worldwide, new technology integration can be developed to further enhance learning experience as well as accessibility and availability. After all, the main reason behind E-learning technology is to make high quality education accessible and available to prospective students, worldwide without them physically present. This has created an industry that has vast opportunities to explore in order to continue to enhance learning experience.

5.6   Conclusion

In conclusion, the researcher can boldly say that the research is successful, due to the fact that it has been able to set out objective and milestones through its formulated hypothesis, which has all been achieved. These have been confirmed in the evaluation and discussion part of the chapter. This does not in any way mean that research should stop here, but it has been able to create a niche for more future research in this regard, taking into consideration, E-Learning adoption.

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