PRE-SERVICE TEACHERS' ACCESSIBILITY AND ATTITUDE TOWARDS E-LEARNING RESOURCES FOR TEACHING CHEMISTRY IN COLLEGES OF EDUCATION IN NIGER STATE

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MTech/SSTE/2017/7206

A THESIS TO BE SUBMITTED TO POST GRADUATE SCHOOL, FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGERIA IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF TECHNOLOGY IN SCIENCE EDUCATION (CHEMISTRY EDUCATION)

NOVEMBER, 2021

ABSTRACT

This study examined Pre-service Teachers Accessibility and Attitude towards E-learning Resources for teaching chemistry in Colleges of Education in Niger State. The study employed descriptive survey research design. The population of the study comprised 3500 pre-service teachers (1728 males and 1772 female), systematic random sampling technique was used to select a sample of 350 pre-service teachers (167 males and 183 females) for the study. The research instruments used for this study were questionnaires titled Questionnaire on Pre-service Teachers Accessibility to E-learning Resources for teaching of chemistry (QOPTATER) and Questionnaire on Pre-service Teachers Attitude towards E-learning Resources for teaching of chemistry (QOPTATOER). The instruments were validated by two experts from Federal University of Technology Minna. The reliability coefficients of the instruments obtained were 0.926 for (QOPTATER) and 0.826 for (QOPTATOER) using Cronbach alpha. Data collected from the study were analyzed using descriptive statistics of (mean and standard deviation) to answer research questions and the null hypothesis were tested using inferential statistics of Mann Whitney (U-test) at 0.05 level of significance. The result of the study revealed that pre-service teachers had positive attitude towards E-learning resources irrespective of their gender. Based on the findings, it was recommended that educators in teacher training institutions should make proper use of E-learning resources in their lecture delivery to enable pre-service teachers benefit from it.

TABLE OF CONTENTS

CHAPTER TWO

CHAPTER THREE

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

Abbreviations

SSTE	School of Science and Technology Education
HOD	Head of Department
CD-ROM	Compact Disc Read only memory
OPAC	Online Public access catalog
ICT	Information and Communication Technology
SPSS	Statistical Package for the Social Sciences
ETF	Educational Trust Fund
TETFUND	Tertiary Education Trust Fund
CMC	Computer Mediated Communication
OAJ	Directory of Open Access Journal
SDL	Self direct learning
IS	Information system
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Action
AU	Acceptability or Actual Use
PU	Perceived usefulness
PEU	Perceived Ease of Use
UBT	University of Business and Technology

LIST OF APPENDICES

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

Technology is a major part of students' lives and their academic training requires an introduction to scholarly uses of it. Technology offers tremendous promise for student learning and has ignited the imagination of those who are interested in bringing about revolutionary gains in the achievement of all students. Yet, the use of technology in education also raises a whole host of challenges, including those related to cost-effectiveness, teacher professional development, assessment, equity, and safety. Despite the challenges of accessing technologies in education and teaching, the importance of the adoption and use of digital technologies in school education should not be underestimated (Skolverket, 2016).

In recent decades, a technological revolution has taken place in large parts of the modern world. Society has moved from a society characterised by the living conditions of industrialism to the present knowledge society where creativity and ingenuity stimulates and drives the society (Hargrewes, 2016). “A knowledge society is really a learning society... knowledge societies process information and knowledge in ways that maximize learning, stimulate ingenuity and invention, and develop the capacity to initiate and cope with change” (Castells, 2018). Earlier societies were characterised almost exclusively by an educational system where teachers and students physically interacted in the classroom. Major technological developments characterising society, especially during the last 20 years and mostly because of the Internet have changed our view of education (Castells, 2018). Today, for example, we are talking about concepts such as “the flipped

classroom". This concept refers to the way that teachers and students in today's educational systems use different information and communication technologies (ICTs) for teaching and learning activities in classrooms. Another concept that has emerged during the last 15 to 20 years is "E-learning". According to Laurillard (2014), E-learning describes the interaction in which students use different types of ICTs in their learning process. Education in a knowledge society context is given a key role for developing new ideas in learning and teaching through e-learning (Kaltundu, 2010).

Chemistry is seen as a natural science, which plays very crucial roles in scientific and economic development of nations, it is the study of the nature and properties of all forms of matter as well as substances that make up our environment and the various changes which these substances undergo in different conditions. Chemistry is one of the fundamental ingredients of technology as a branch of science that deals with the practical and experimental understanding of natural phenomena (Gbamanja, 2011). The study of chemistry follows from the simple to a more complex process, hence chemistry is said to be more process than a product. A very important aspect in the delivery of chemistry is the methods and materials employed in transmitting knowledge. This implies that, like every other science subject, the teaching and learning of chemistry can only be effective by the use of instructional resources (instructional materials, E-learning resources, teaching aids, audio –visuals). E-learning resources are aids employed by the teacher to enhance the effectiveness of instruction. They are information specifically designed to elicit desired behavioral change in the learners, E-learning resources include a wide variety of equipments and materials used for teaching and learning ranging from hardware to software (Gbamanja, 2011).

However, most of these resources are not adequately accessible in many Nigerian schools, where they may be available; they may be under used or not used at all by the teachers for

teaching chemistry. Learning is more effective and maximized if the environment has adequate resources. A bare and uninteresting room offers little or no stimulation for learning. Days have come when science teachers should be resourceful and must be able to improvise where necessary so as to make their teaching more meaningful and interesting. Nigeria shall not continue to operate an educational system where most of the chemistry classrooms and laboratories are empty and expect to be self-reliant in the area of science and technology. Quality and effective teaching of chemistry depends largely on adequate provision and proper access to E-learning resources. A practical-based approach to chemistry is the key to a breakthrough in science and technology advancement (Gbamanja, 2011).

E-learning or traditional on-campus education, education has a large and vital role to play for people living in developing countries. The importance of education in developing countries has a more profound implication on people's lives. It is of great importance for countries worldwide to maintain a stable level of human capital. From an educational perspective, this can be said to be important because education leads to higher growth and improvement for the country as a whole (World Bank, 2016). This is particularly the case for developing countries, where growth by means of education often is considered the key to development. For example, Bada and Mardon (2016) argued that economical growth and a strong human capital is a fundamental prerequisite for any country. An increase concerning the capacities of the people in a society and promotion of their wellbeing through economic growth and development is a central goal in human resource development. As such, growth and development processes education is a key player.

Accessing e-resources for teaching of chemistry relies solely on the available information and communication technology infrastructure, example of which include electronic data base and e-libraries, which are mostly lacking in many Nigerian schools as a result of inadequate support of infrastructures for E-learning (Sinha, 2011 & Abdulsalami, 2011). The design and

management of E-learning resources also plays significant roles, as many E-learning resources are basically designed to suit the need and curriculum of specific groups of people and is managed under certain terms and conditions, which may render it inaccessible to many people outside this group. As a result many Nigerian teachers are not able to access E-learning resources that are designed to suit the need of their students, especially in practical demonstrations and experimentations in chemistry, simply because they exist in databases that belong to foreign institutions of learning and its terms and conditions of usage have excluded Nigerian teachers from access to such E-learning resources. Many teachers are also lacking the commitment to develop and design E-learning resources for teaching of chemistry (HudronKeri & Baro, 2014). On the other hand, research materials for teaching of chemistry are easily accessible through the internet from e-resources like online catalogues, and online reference works, journals, data archives, manuscripts, books, magazines, theses, newspapers, e-mail, research reports, and bibliographic databases (Sharma, 2014).

Pre-service teacher education is the education and training provided to student teachers before they have undertaken any teaching. In contrast, in-service teacher education provides learning opportunities for practicing teachers. Before entering into a pre-service education program, most students will have obtained a previous academic degree, either a general or honours, in a subject of their choice, (*e.g.* English, math, science, religion). The alternative to this is that students may work simultaneously on an undergraduate bachelor's degree and a pre-service education program. The latter route incorporates education courses throughout the program's 4 or 5 years, and culminates in a final year of specific pre-service training. Students who complete a bachelor's degree before returning to a university to complete the pre-service education program are in a consecutive pre-service program, while students who complete their pre-service training at the same time as their undergraduate degree are in a concurrent" program.

The practical nature of pre-service education training programs aligns with American philosopher John Dewey's theory of experience. In his book Experience and Education Dewey prescribes that learning must be based upon the actual life experiences of an individual that are interactive, experimental, and purposive in nature. Donald Schon expanded upon Dewey's model by focusing further upon the importance of reflective practice in the learning process. Schon was a proponent of using reflection in teacher education and other professions to guide learning through reflection on past experiences to guide future learning and practice, as evidenced in his 1996 work, Educating the reflective practitioner: Toward a new design for teaching and learning in the professions.

Many teachers are of the believe that E-learning resources are important to their research and valuable for their students learning processes (Heterick 2012). Therefore it is very important to note that with increased access and training of both teachers and students as regards the use of E-learning resources, academic activities and attitude would improve significantly (Jagboro 2016). Even if teachers are properly trained as regards the use of electronic resources, Students' attitude is a very important factor towards achieving E-learning (Ibrahim 2016). Most of the students in developing countries are left behind towards their involvement in the use of e-resources; this is as a result of the nature of their institutions which have struggled to meet up proportionately in the provision of conducive environment for learning, thus drastically affecting the attitude of many students (Archibong *et al*., 2010). However, there is adequate need to improve on the students 'attitude through increased access to e- resources and accessibility of infrastructures which support E-learning. It is very important for any academic e-resources to improve its services towards the students' attitude and provides adequate information resources in all formats that can support the institution in achieving their educational goal (Adeniyi & Ajiboye, 2013).

Male and female differ in their levels of trust, risk aversion and information processing, but also in their attitudes and instrumental motives of using and accepting Web environments (Lee & Lee 2017). However, some studies indicated that female communicated more, have a greater social presence, and are more satisfied with online courses than male (Gonzalez *et al*., 2012; Johson, 2011). Nowadays, we live in the information and communication era, but, are there still differences between male and female with regard to accessibility and attitude towards E-learning resources? In this regard, the researcher proposes to find out whether there is difference between male and female in terms of Pre-service teacher's access to E-learning resources and their attitude towards E-learning resources. In turn, results from these findings may help the proper design of such environments to respond to the different motivations of students. It is apparent that the print age is paving the attitude to electronic information resources.

Gender is considered a cornerstone to explain inequalities and identities in modern society (Anthony & Shell 2018). Against the background of the adoption of information technologies, and particularly from the theoretical perspective of the Technology Acceptance Model, the literature recognizes that gender is a key element to understand the differences in accessibility and attitude of use as determinants of technology adoption (Bada & Mardon, 2016). But with regard to E-learning platforms, does gender affect how college students adopt information technology to provide efficient and effective learning solutions?

Since the early 1990s, several initiatives aimed to increase the accessibility of E-learning resources have resulted in a significant increase in the number of African institutions subscribing to these E-learning resources. The present study seeks to expand

on Pre-service teachers' accessibility and attitude towards E-learning resources for teaching chemistry in colleges of education in Niger State.

1.2 Statement of the Research Problem

Chemistry students in colleges of Education are not very technologically confident, with some of them developing phobia because of their consistent poor achievement on assessment or repeated failure in examinations, therefore they need technological support. Evidences have shown that most concepts in chemistry are indeed difficult to learn by most students. Many scholars agreed that E-learning resources play an increasingly important role in facilitating the educational processes and systems of today.

These are not commiserating with the attitude of the students, lack of commitment and laxity of lecturers in their quality of teaching and accessibility of E-learning resources to help students in solving academic problems. Many research on the use of E-learning resources revealed that E-learning improves students' achievements and performance. For a college of education to be able to adopt and use e-learning in educational activities, it is preferable that sufficient resources and conditions within the organisation already exist. Lack of different types of resources is a common problem in the take-up of e-learning. Developing countries spend more money on higher education, based on their assets and income, compared to more developed countries. Despite that, developing countries spend considerably less resources per student compared with developed countries and, thus, the fact remains that the quality of higher education, to a large extent, is dependent on government grants. Some researchers have examined the impact of E-learning information on both lecturers and students but none have investigated the accessibility and attitude of Pre-services teachers towards the use of E-learning resources in teaching of chemistry in Colleges of Education in Niger State.

1.3 Aim and Objectives of the Study

The aim of this study is to investigate Pre-service Teachers Accessibility and Attitude towards E-learning resources in colleges of education in Niger State. For the purpose of this study; the following objectives are targeted to be achieved:

i. To examine Pre-service teachers' level of accessibility of E-learning resources in colleges of education in Niger State.

ii. To determine Pre-service teachers' attitude towards accessing of E-learning resources in colleges of education in Niger State;

iii. To determine Pre-service teachers' attitude towards the accessibility of E-learning resources in colleges of education in Niger State based on gender;

iv. To identify the Challenges faced towards accessing E-learning resources for teaching chemistry in Colleges of education in Niger State.

v. To identify the Challenges faced towards accessing E-learning resources for teaching chemistry based on gender in Colleges of education in Niger State.

vi. To identify male and female pre-service teachers' perception of the extent of E-learning resources accessible in colleges of education in Niger State based on gender.

1.4 Research Questions

The following research questions were raised to be answered:

1. What are the level of Pre-service teachers' accessibility of E-learning resources in colleges of education in Niger State?
2. What is the attitude of Pre-service teachers towards accessing of E-learning resources in colleges of education in Niger State?
3. What is the gender difference in the attitude of Pre-service teachers towards accessing E-learning resources in colleges of education in Niger State?

4. What are the challenges faced towards accessing of E-learning resources for teaching chemistry in colleges of education in Niger State?
5. What are the challenges faced towards the accessing of E-learning resources for teaching chemistry based on gender in colleges of education in Niger State?
6. What is the male and female pre-service teachers' perception on the extent of E-learning resources accessible in colleges of education in Niger State based on gender?

1.5 Hypotheses

The study was guided by the following formulated null hypothesis, tested at 0.05 level of significance:

HO_1: There is no significant difference between male and female Pre-service teachers' extent of accessing E-learning resources in colleges of education in Niger State,

HO_2: There is no significant difference between male and female Pre-service teachers' attitudes towards accessing E-learning resources in colleges of education in Niger State.

HO_3: There is no significant difference between male and female Pre-service teachers' perception on the challenges faced towards the use of E-learning resources for teaching chemistry in colleges of education in Niger State.

1.6 Significance of the Study

The findings of this study would be of practical and theoretical benefits to the following stakeholders: Chemistry students, Chemistry teachers, textbook authors, examiners, government, curriculum planners and the society at large. It would develop in the students listening skill, writing skill, communication skill, time management skill, manipulative skill amongst other skills needed for self-development and self-reliance. It will also make the

teaching of Chemistry to be practical to real life, less abstract, remove fear/ phobia, remove frustration, and thereby solve the problem of poor students' achievement in Chemistry. The students will get this benefit in form of significant improvement in their academic achievement.

The results of this study would be of great benefit to Chemistry teachers due to the fact that this study will employ activity-based. It will provide modern methods of teaching chemistry, which are capable of holding student's attention, ginger their interest and make them participate fully in the lesson. Teachers will get these benefits through the application of audio-visual aid of E-learning resources in the teaching and learning of chemistry. The benefit would also be through an improved teaching performance.

The findings would also help chemistry teachers who do not know the efficacy of E-learning to be trained; this would bring about innovative and interactive teaching and learning of chemistry, in line with modern trend in the education sector. This would also tend towards expanding the frontier of knowledge in chemistry education. The textbook authors would get this benefit when government enforces strict adherence to effective curriculum implementation, precisely the utilization of E-learning resources in teaching methods.

The findings of the study would also benefit the society at large because it would come to have a crop of students with sound knowledge of ICT which is a vital tool for a productive living, national development and self-reliance. The society would also benefit when students' achievement and interest in chemistry have increased significantly and graduates that are being produced are self-reliant, and able to take rational decisions in solving individual problems and societal problems. This would go a long way in bringing about lasting societal transformation and development. An improved teaching performance by the teachers would also have a multiplier effect on the society.

1.7 Scope of the Study

This research is restricted to the two colleges of education in Niger State (Niger State College of Education, Minna and Federal College of Education, Kontagora). The study was focused on the Final Year Chemistry Students (NCE III). It explored the accessibility and attitude of Pre-service teachers towards E-learning resources for teaching chemistry, emphases will be on gender of students towards the use of E-learning resources.

1.8 Operational Definition of Terms

E-learning: E-Learning is the delivery of learning and training through digital resources. Although E-Learning is based on formalized learning, it is provided through electronic devices such as computers, tablets and even cellular phones that are connected to the internet.

Electronic resources: Electronic resources are materials in digital format accessible electronically.

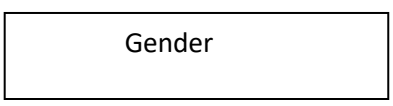
CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Conceptual Framework

A conceptual framework is used to illustrate what you expect to find through a research, it includes how the variable relates to each other. The conceptual framework for this study is presented in figure 2.1 and it shows that, Accessibility to E-learning Resources as the independent variable has a relationship with Teaching of Chemistry which is a dependent variable in the study. It further shows how gender, which is the moderating variable is related to Teaching of Chemistry.

Moderating Variables



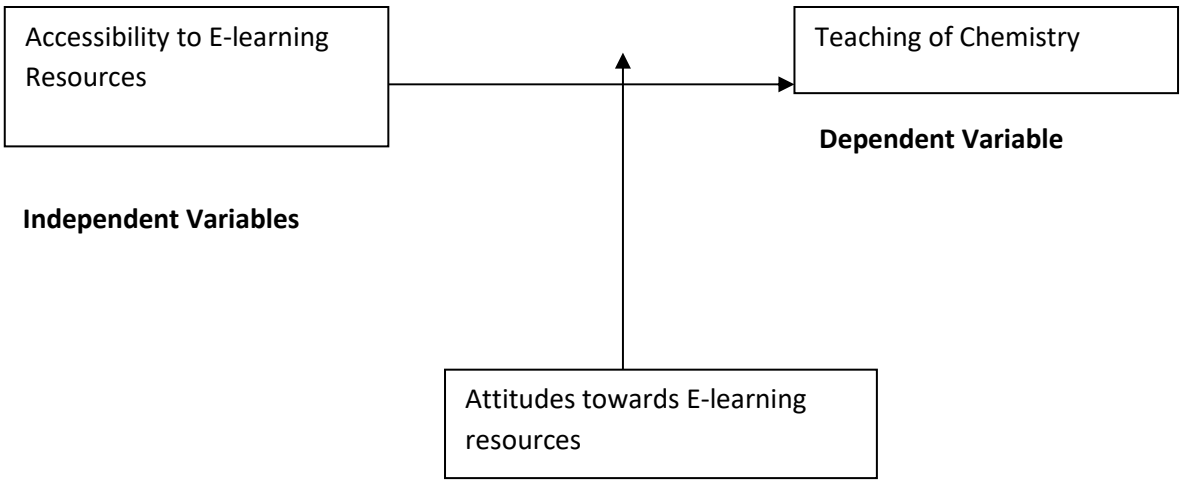


Figure 2.1: Conceptual Framework

Performance in Chemistry as the dependent variable in this study, how does it vary based on the independent variables. Attitude which deals with the overall perception of the learner about learning style and hence influencing performance is the intervening variable. Regardless of the variance of the independent variables, the intervening variable influence is constant. Gender is the moderating variable that provides the interaction effect where it moderates the relations between the independent and the dependent variable. Academic performance in an E-learning setup can be influenced by varied variables either positively or negatively.

2.1.1 Teaching of chemistry

Chemistry students in colleges of Education are not very technologically confident, some have already developed phobia because of their consistent poor achievement on assessment or repeated failure in external examinations. Evidences have shown that most concepts in chemistry are indeed difficult to learn by most students (Johnstone & Otis, 2016). It was lamented that most chemistry educators have lost excitement in carrying out their pedagogical roles, and also considers almost the entire concepts in the senior secondary school Chemistry syllabus as areas commonly found difficult to teach by graduate teachers (Fatokun, 2016). Though Olayiwola (2011) opined that there is no ideal situation that is devoid of one difficulty or the other and that difficulty is an inherent variable in any purposeful activity.

Reid (2015) reported that difficult concepts or topics in chemistry can be simplified by considering and incorporating the following for effective instruction: Assessing student's prior knowledge, diagnosing students' learning difficulties, relating new topic to common application and providing rationale for learning. Matching instructional strategies to students learning style, the use of problem-solving method and development of problem-solving skills, Concept mapping and integrating different teaching methods are very essential. It was affirmed that most students learn in essentially the same environment and learning can be highly effective if the learning situation is consistent with how students learn (Norman, 2011). Since everyone learns differently, understanding learning styles can help a teacher perform better by matching the teaching pattern with students learning styles for appropriate understanding of the lesson content (Kolb & Kolb, 2015). There are different learning styles exhibited by students though the same method or approach is employed during classroom instruction. There is no right or wrong learning style and it has nothing to do with intelligence but it has to do with the way a person's brain works to learn and store information efficiently.

Researchers have shown that students' attitude towards learning affect their performance and educators are interested in the learners' attitude because they are affective variables that are

durable. It was observed that affective variables are as important as cognitive variable in Influencing learning outcomes (Ibrahim, 2013). It is often believed that for any achievement in an endeavor, opportunity, ability and interest are the three essential ingredients of which interest is paramount. Interest (often measured by attitude and mostly reflected by individual' learning style) with its affective and cognitive dimension is a psychological construct that is considered to be a critical predictor of the behavior of a student although the teacher is the fundamental agent in facilitating learning success in an educational situation (Kolb & Kolb, 2015).

The chemistry teacher's creativity is tested as it is still believed that he needs to help his students overcome their fears, approach chemistry with confidence, develop problem solving skills, apply principles of chemistry when solving problems and equally understand that chemistry is a part of everyday life. He needs to emphasize the process of science and the language of Chemistry. He should also provide real-world application to his teaching as he helps his students to evaluate their learning (Fatokun, 2016).

2.1.2 Concept of e-learning

E-learning is defined as a system based on technology, organization, and management which bestows upon students the ability to learn via internet and facilitates their learning (Levy, 2016). E-learning makes use of telecommunications technology to get information to achieve the teaching and learning objectives (Bowles, 2010). Also Wantling *et al.* (2012) defined E-learning as acquisition of the disseminated knowledge using electronic devices. it can be said that E-learning refers to the use of systems of electronic education such as computer, internet, multimedia disks, electronic magazines, virtual newscasts, and so on whose purposes are to reduce time and expenses and achieve better, faster, and easier learning (Zare *et al.*, 2015). Employment of information and communication technologies in education has created a new

mode of learning which does not require physical attendance; hence, learning has been made possible in environments other than classrooms (Gholamhosseini, 2011).

Keshavarz *et al.* (2013) concluded that E-learning has a positive impact on academic achievements of students. Zarie-Zavaraki and Rezaei (2011) in their study at the E-learning center in Khaje Nasir Toosi University in their conclusion found that the use of e-portfolio significantly improved students' attitude, motivation and academic achievement. Mahmodi *et al.* (2015) found that the use of e-learning in physiology teaching-learning process improves students learning and creativity. Zare *et al*. (2015), also found that learning and recollection of students who were educated to multimedia methods, is more than learning and recollection of students who were educated in the traditional methods.

Review of studies conducted in the field of E-learning application and its impact on learning and creativity suggests that the use of this teaching method in the teaching-learning process can lead to the effectiveness of training. Emergence of new theories of teaching and learning has made the education to shift from being teacher-oriented to being student-oriented. Moreover, development and evolution of new communication devices has enabled modern man to use modern methods of teaching and learning and get free from time and space barriers and keep on learning in any time and place according to his needs and demands (Hosseini *et al*., 2015).

The use of electronic technologies has led to the development of educational opportunities and students develop their skills. According to studies, the evidence shows that e-learning can have a profound and positive impact on learners' involvement, positive attitudes of teachers, personalized learning, and learners' creativity (Magnoson *et al.,* 2010). Negash and Vilkas (2015), suggested that there are six different types of e-learning. These six types are presented below:

i. E-learning with Physical Presence and without E-communication (face-to-face)

ii. E-learning without Presence and without E-communication (self-learning)

iii. E-learning without Presence and with E-communication (asynchronous)

iv. E-learning with virtual Presence and with E-communication (synchronous)

v. E-learning with occasional Presence and with E-communication (blended/hybrid-asynchronous)

vi. E-learning with Presence and with E-communication (blended/hybrid-synchronous)

Different types of E-learning methods have been proposed, but the present study focuses on the second type of self-directed learning method of E-learning. In fact, this type of e-learning is the self-instruction of self-paced method of learning. In this method, the learners use the educational media and take responsibility of learning on their own.

2.1.3 E-learning resources

According to Sinha *et al* (2011) e-resources can be defined as those resources which contain documents in electronic format that can be retrieved via the internet in a library environment. In other words, e-resources are those electronic artifacts that provide a collection of document, be it text, image and other multimedia artifacts like statistical, graphical mode which are available for library and information centers. These may be delivered on CD-ROM over internet. The availability of e-resources helps students to find e-journals, e-books, e-magazines, e-database, e-subject guide, e-newsletters, e-white paper, e-audio, e-exhibitions, e-conferences and web search tools on a range of topics or disciplines.

The advent of e-resources has cut the obstacle of valuable information difficult by students in the developing countries. In the same vein, Issa *et al* (2011) emphasized on the popularity of e-resources, flexible in searching rather than the paper based and they can access in a remote area or in an academic library. Similarly, Ojedokun and Okafor, (2011) described the academic

library as: A collection of full text and bibliographic information source which joins human services (such as electronic publishing, personal management and distance information use) and information technology tools (such as those to support browsing, authorizing and communication. Therefore, the academic libraries have a physical space ICT facility of different types used for production, storage and dissemination of information.

In another development, Issa *et al.* (2011) emphasized that there are different kinds of academic libraries for the various information needs of the targeted group of students. Some are developed by groups or organizations, higher education institutions, research centers, national libraries, as well as public libraries. They include contents that are both digital and those that have been digitized. Therefore, an e-resource generally contains e-books, e-journals, OPAC, web-bibliographies (equivalent to a printed bibliography), letters, maps, dictionaries, encyclopaedias, still and moving images, sound recordings, indexes, conference/seminar proceedings, e-theses/dissertations, e-abstracts and e-reviews, and handbooks. The traditional libraries have limited storage space, but the present academic libraries require very little physical space, which reduces the cost of maintaining academic e-resources (Issa *et al.,* 2011). In this study, e-resources refer to a collection of information resources in electronic formats that can be accessed by the students inside the academic resources are expected to have a positive effect on Nigerian Libraries. Therefore, Nigerian libraries are: To offer quick and easy ways of performing increased workload of library tasks with academic library. The benefits derived from the acareater efficiency; to enhance adequate ICT for easy accessibility of information needed by students‘; to enable major policy persons and strategies to be defined in relation to ICT; to exhibit the visions and hope for information users is now involved in resource sharing enabled by ICT; to enable libraries to fully adopt the use of ICT in information handling and library services such as indexing cataloguing, reference and information retrieval services, circulation, serial control and the provision of other technical services; to enable libraries to establish a positive correlation in

the networked world; Nigerian libraries have now been found to shift their focus of operation from library centered to information-centered; the abilities to access information and adapt it for local problem solving are the real changing dividends as against information control (Issa *et al.,* 2011).

Students widely use e-resources to access information in support of the print sources for their studies, hence Abubakar and Adetimirin (2015) agreed that e-resources constitute an important source of information and are widely contained by libraries to process and disseminate information to its users all over the world. Electronic sources consist of information sources that are in electronic format, and are characteristically very easy to use when accessing information compared to sources in print. Libraries, irrespective of their purpose, have started incorporating e-resources into their services to provide users with more efficient, effective and reliable sources of information. The age of total support on print information sources has passed, current large volumes of print information sources are being converted to electronic format (Issa *et al*., 2011). Therefore, Adekunmisi *et al*. (2013) indicated that many academic libraries in Nigeria are currently building academic repositories of their publications and other works that can be digitized and made available to students without restriction.

2.1.4 Concept of accessibility of a-learning resources

In this technology age, information and communication technology (ICT) is fast becoming a major source of information. The internet has greatly changed the way people obtain information which also affects their reading culture. The internet has now become the way of life of many people, especially adolescents. Internet has changed the world in an incalculable number of ways. It has changed the way people communicate, the way business is done, and the way information is shared and received. The academic library is the hub of every academic activity in higher institutions, where researchers and students are granted access to an army of

refined information. To the undergraduates, the library is the learning centre because it provides materials that are needed for learning in all the courses that may be offered by the institution Aina (2014). The study of the use of e-learning resources across academic disciplines in academic institutions has been the crux of most researches in the information science since evolution of the information age in view of its impact on the society particularly in the universities. While technology is slowly taking a steady control over individual lives, Librarians are constantly improving the provision of information services by harnessing the acceptance accorded to ICTs by collection and provision of electronic learning resources. this is because browsing the net, thereby making reading a book or any other piece of written material in a quiet or peaceful corner of a library or home becomes an archaic and unfashionable idea for most school children and adults Bond (2012). Chigbu and Dim (2002) estimated that on the average, young people spend more time watching TV and videos, listening to music, using computers and playing video games instead of reading. Also Chigbu and Dim (2002) reported that 85% of children prefer watching television over reading. The traditional reading habits of library users, especially adolescents, have now change with the advent of ICT. Emerson and Taylor (2014) showed that users (especially younger users) have developed a clear preference for receiving information in electronic formats. Liu *et al* (2019) observed that college students reading habits have change drastically from paper-based to Internet-based reading. He revealed that 83.9% of students read information electronically everyday whereas only 31.4% and 33.1% read newspapers and magazines daily, respectively. Ramirez (2013) and Liu *et al* (2019) revealed that with the growing amount of digital information accessible, people particularly young adults are found spending more time reading electronic materials. A report released by the Pew Internet and American Life Project observed that 73% of college students reported they use the Internet more than the library for research, however, only 9% said that they still gather information the old-fashioned way. Liew (2010) found out that a majority of graduate students prefer electronic journals over print journals.

According to World Bank (1994), tertiary education is seen as the capstone of the traditional education pyramid. As the apex of educational structure, it is a critical pillar of human development which provides a lifelong learning framework for training high-level skilled human capital resources in all spheres of life namely, teachers, doctors, nurses, civil servants, engineers, humanities, entrepreneurs, scientist and myriad of personnel. The authors further maintained that improved tertiary education is necessary for sustainable progress in basic education. With the advent of globalization and information revolution, education is expected to create intellectual capacity on which knowledge production and utilization depends on. It is also expected to play a key role in promoting lifelong learning practices that is necessary for updating people's knowledge and skills. To achieve this, tertiary institutions need to change their instruction modes of operation and delivery by taking advantage of E-learning technologies, which is an integral part of information communication technology. Realizing the importance of E-learning resources, the Government, particularly at the federal and state levels in conjunction with some non-governmental organizations (NGOs) have contributed towards the promotion and provision of information communication technology facilities and capacity building in some Nigerian tertiary institutions. However, a bit more is needed in this regard. The inclusion of information communication technology courses is compulsory in all courses in Nigerian tertiary institution and as a major feature in education courses point to the fact that ICT and E-learning is a necessity and of great importance, if we are to achieve the millennium development goals of the UNESCO. The support on the access of E-learning resources has received wide acceptance from information professionals, government, stakeholders and educationists as improving the teaching and learning process.

According to Agyeman (2017) the Nigerian policy on learning technologies capped 'National Information Technology Policy (NITP)' was approved in March 2001, leading to the subsequent establishment of the National Information Technology Development Agency (NITDA) to implement NITP in April 2001. The policy stipulated the relevance of ICT to tertiary education.

To further strengthen the impact of the policy, the National Universities Commission (NUC) prescribed PC ownership for universities as follows: ne PC to every four students, one PC to every two lecturers below lecturer I; one PC per senior lecturer, and one notebook per reader/professor (Agyeman, 2017). The importance of timely access of electronic learning resources cannot be over-emphasized, as resources may be available in the library and identified in the bibliography of the library as relevant to one's subject of interest, but the user may not be able to lay hands on them Agolu and Agolu(2012). There are indications that the profitability of E-learning resources on learning are enormous, Scott (2016) observed that researchers and librarians perceived e-learning resources as one of the valuable resource tool at their disposal and strongly urge that their use be continued and expanded. Despite these laudable prospects of E-learning resources, optimal accessibility remains crucial towards plausible research out come. No doubt, the existence of E-learning resources would be of no positive consequence learning if they are not accessed and utilized by students for learning and plausible research outcome. The campaign on acquisition of E-learning resources across academic institutions yielded positive outcome, therefore, attention has been focused on the level of accessibility and attitude of students towards E-learning resources.

2.1.5 The role of e-learning on academic performance

Attitudes concerning E-learning, echoed by scholarly and academic reviews, range from neutral to positive. On one hand, it is noted that E-learning is at least as effective as traditional instructional strategies (Rosenberg *et al.*, 2013), and that there are no major differences in academic performance between the more traditional and more technology-oriented modes of instruction (Cavanaugh, 2011). On the other hand, many reviews go further, reflecting a principally positive attitude towards the impact of E-learning. The current piece sought to demystify E-learning by concentrating on how specific E-learning factors (demographic characteristics, Accessibility and Attitude) influence individual academic performance. There is a considerable body of evidence to suggest that different teaching delivery styles can have

different degrees of success; as measured in terms of academic results (Emerson & Taylor, 2014). In relation to online teaching, some studies indicate that this medium of delivery has a positive impact on performance. Other studies however, find that greater online teaching has a negative impact on performance (Johnson, 2015).

Benefits include offering a variety of new possibilities to learners (Breuleux *et al.,* 2012), in addition to having a positive effect on students' achievement in different subject matter areas (Chambers, 2013). Other benefits of electronic education include increases in enrollment or time in school as education programs reach underserved regions, broader educational opportunity for students who are unable to attend traditional schools, access to resources and instructors not locally available, and increases in student-teacher communication. According to Barker and Wendel (2011) students in virtual schools showed greater improvement than their conventional school counterparts in critical thinking, researching, using computers, learning independently, problem-solving, creative thinking, decision-making, and time management. A study by Calderoni (2010) revealed that academic advantages over traditional classroom instruction were demonstrated by students in Mexico's Telesecundaria program, who were "substantially more likely than other groups to pass a final 9^{th} grade examination" administered by the state; by students taking a chemistry by satellite course; and by students learning reading and math via interactive radio instruction (Yasin & Luberisse 2010).

Electronic education is not the most effective choice in all situations. Students may feel isolated, parents may have concerns about children's social development, students with language difficulties may experience a disadvantage in a text-heavy online environment, and subjects requiring physical demonstrations of skill such as music, physical education, or foreign language may not be practical in a technology-mediated setting. Bond (2012) found that

distance between tutor and learner in an online instrumental music program has negative effects on performance quality, student engagement, and development and refinement of skills and knowledge. Virtual school students show less improvement than those in conventional schools in listening and speaking skills (Barker & Wendel 2011). Highly technical subjects have also proven to be difficult to teach well online. The Alberta Online Consortium evaluated student performance on end-of-year exams among virtual school students across the province, and found that virtual school student scores in mathematics, and the sciences lagged significantly behind scores of non-virtual school students (Schollie, 2011).

Kearsley (2010) note that given instruction of equal quality, groups of students learning online generally achieve at levels equal to their peers in classrooms. Equality between the delivery systems has been well documented over decades for adult learners. Evidence to date convincingly demonstrates that when used appropriately, electronically delivered education 'e-learning' can improve how students learn, can improve what students learn, and can deliver high-quality learning opportunities to all children" West African Examinations council (WAEC, 2007).

2.1.6 E-Learning and gender

There is a controversial debate about the role of gender in education with regard to the similarities and differences between males and females, and their pedagogical implications. This debate started in the 70s when the issue of differentiated instruction and the ideal of gender equality was raised. Beyond the controversy, and the possible desirability of an adapted education for male and female, over the years research has been noting differences between males and females influencing pedagogical issues. For example, the existence of differential attendance rates between male and female students, gender differences in communicative style and approach to study Patricio *et al.* (2015), gender effects in levels of achievement motivations for subjects Tempelaar *et*

al. (2011), whether the impact of social integration on subsequent institutional commitment is conditioned by gender Jones (2010) or the gender gap in study abroad participation (Salisbury *et al.,* 2010). In relation to E-learning, gender equity is a factor to be considered in designing courses. In fact, Tenopor (2013), based on a sample of students enrolled in on-line courses, found that there was a difference in the learning style of the on-line student and the student in the face-to-face course, and that gender was a factor in the association between learning style and student engagement. According to these authors, the last finding supports the need for including gender equity in building and designing courses and programmes. E-learning valuation and satisfaction are greater among male students than female student's (Lu & Chiou, 2010). Nevertheless, some research studies suggest that gender has no effect on satisfaction or attitudes towards E-learning or on teaching results (Hung *et al.,* 2010; Chu, 2010). In addition, Cuadrado-García *et al.* (2010) evaluated the existence of significant differences in relation to gender in the assessment and use of E-learning activities by students of two European universities. They found that there are few differences between male and female students in their satisfaction about E-learning activities. Furthermore, the study of Hung *et al.* (2010) validated a multidimensional instrument for college students' readiness for E-learning in Taiwan. The instrument used had five dimensions: self-directed learning, motivation for learning, computer/Internet self-efficacy, learner control, and on-line communication self-efficacy. Their results revealed that gender made no statistical differences along the dimensions of on-line learning readiness. Likewise, the research of Chu (2010), based on adult E-learning students, shows that there are similarities between females and seniors beyond gender-related differences. Moreover, no gender differences between males and females with respect to academic performance in secondary students. Female students even score E-

learning courses higher on average than male students (Gonzalez-Gomez *et al.* 2012). From a psychological standpoint, females are oriented to engagement, contact and taking care of other people, so they are more inclined towards human relationships. However, males are oriented to separation and abstract thinking, which predispose them towards personal achievement and subordinate relationships. In addition, brain research has supported the existence of differences in brain structure between male and female at birth, without prejudice to a response to the influences of their environment (Fagbami, 2014).

In the field of Web-based learning, the lack of such gender-related research is clear. However, the researcher found some papers that focus on gender differences and their consequences. Starting with the basics—use of computers—there are studies that find significant differences in the attitude to computers, and in perceived self-efficacy regarding completion of tasks. Males feel safer than females in the use of computers. Going one step further, focusing on Internet, studies show how, due to differences by gender in Internet usage and preferences by tasks, male and female perceive and use the Internet in a different way Patricio *et al.* (2015), In this sense, each gender uses technology differently. Males tend to use the Internet and the Web to find information, while females normally use the Web to communicate to others (Rader, 2014). In addition, male students feel more at ease with E-learning than female students. What is more, males' E-learning satisfaction was higher than that of females in a northern Taiwan university. Specifically, Lu and Chiou (2010), based on five hundred and twenty-two university students from Taiwan, analysed satisfaction with e-learning systems. Their results showed that two contingent variables, gender and job status, significantly influenced the students' satisfaction with the E-learning system. However, in a study carried out in Sweden, female were more positive towards E-learning than

male. This was confirmed by a different study that took place in Taiwan (Hsieh & Yang 2012).

The evidence about the effect of gender on the acceptance of information technology is not conclusive Jun and freeman (2010). The results of previous studies show conflicting evidence in relation to whether gender affects or not the likelihood of using a computer system. For example, some results indicate the existence of such effects Taylor (2004), and on the contrary, other findings indicate that these effects may disappear, especially in a young population (Bond, 2012). Also, in Web environments clear evidence on gender-related effects does not appear.

A study reports that there are not statistically significant differences between male and female in the process of adopting a particular Web technology (Anthony & Shell, 2018). In contrast, there is previous evidence of gender-related effects in the context of the adoption of E-learning (Ansari & Zuberi, 2010). Particularly, male's perceptions on perceived usefulness, perceived ease of use and behavioural intention to use E-learning are higher than women's perceptions. In addition, perceived usefulness influences behavioural intention to use E-learning more strongly for male than for female. Likewise, perceived ease of use influences the perceived usefulness of E-learning with more force in female than in male (Ansari & Zuberi, 2010). Similar results were obtained by other authors, they found significant differences between male and female in the levels of behavioural intention to use the E-learning platform of a Spanish university. Furthermore, they showed that gender moderated the relationship between perceived usefulness and perceived ease of use. Similarly, an article Tarhini *et al* (2014) indicates that gender moderates the relationship between perceived usefulness and behavioural intention to use an E-learning platform in Lebanon. However, other

researchers Parra-merono and Carmona-martinez (2011), show that gender variable generates significant differences in relation to the usage of E-learning platforms. More specifically, they found that female use these platforms with greater frequency and intensity than male. According to this idea, they conclude that male and female students have a different behaviour for using E-learning platforms. Moreover, another study Yang and Hsieh (2013) indicates that the gender variable influences the behaviour of online learning in Taiwan. Considering the controversy explained above, the researcher sort to find out Pre-service teachers accessibility and attitude towards E-learning resources based on gender difference.

2.2 Theoretical Framework

The theories underpinning this study are Constructivism theory and Technology Acceptance Model

2.2.1 Constructivism theory

Constructivism is 'an approach to learning that holds that people actively construct or make their own knowledge and that reality is determined by the experiences of the learner' (Elliott *et al*., 2000).The central idea of Constructivism is that human learning is constructed, that learners build new knowledge upon the foundation of previous learning. This prior knowledge influences what new or modified knowledge an individual will construct from new learning experiences (Phillips, 1995).When learners encounter something new, they reconcile it with previous knowledge and experience. They may change what they believe, or they may discard the new information as irrelevant. To be active creators of their knowledge however, they must be able to ask questions, explore and assess what they know. The second notion is that learning is an active rather than a passive process. The passive view of teaching views the learner as 'an empty vessel' to be filled with knowledge, whereas constructivism states that

learners construct meaning only through active engagement with the world (such as experiments or real-world problem solving).Information may be passively received, but understanding cannot be, for it must come from making meaningful connections between prior knowledge, new knowledge, and the processes involved in learning (Phillips, 1995).

Constructivism modifies the role of the teacher so that teachers help students to construct knowledge rather than reproduce a series of facts. The constructivist teacher provides tools such as problem-solving and inquiry-based learning activities like in E-learning setup so that students can formulate and test their ideas, draw conclusions and inferences, and convey their knowledge in a collaborative learning environment. The teacher must understand the students' preexisting conceptions and guide the activities to address this knowledge and then build on it. Constructivist teachers encourage students to assess how the activity is helping them gain understanding. By questioning themselves and their strategies, students become expert learners as they learn how to learn, with the use of computers online and/or offline. The students then have the tools necessary to become life-long learners (Mcleod, 2019).

The teaching-learning method in E-learning is assumed to be self-directed learning (SDL), which is supported by the educational philosophy of constructivism. According to constructivism theory, E-learning is an active information process because knowledge generation is accomplished through individual experience, maturity and interaction with one’s environment. Due to this point of view, the educational philosophy of constructivism is distinguished from objectivism in that the learner is regarded as a passive recipient of information (Lee, 2016).

Learning performance with regards to E-learning is possibly lower than a crammed educational style based on objectivist educational philosophy, with the exception of a strategic approach relating to the efforts and studies for the pleasure of the self-learner. Lee *et al* (2017) point

that the SDL teacher is available as an assistant and guide for learning, not as a unilateral knowledge source and messenger. Learners take the lead in self-regulated learning for the development of a total learning process that involves problem perception, adoption, and assessment of alternatives (Lee, 2016). Learners play the same roles that the producers do by organizing or re-organizing knowledge like a consumer, by selecting knowledge and using it practically (Thatcher and Pamela, 2012).

E-learning must be considered as one of many SDL strategies. The reason is that an E-learner attends a lecture only to register the time, place, subject, and to alter the order of attending lectures. Proper monitoring of the learner is difficult in comparison with the off-line education already being used, not only because the learning progress method of evaluation is being altered, but because personal meetings with the teacher are also no longer part of the process. Therefore, it is important to manage one's ability to organize self-learning time, process information, plan data, and control data.

2.2.2 Technology acceptance model

The second theoretical framework for this study was based on the Technology Acceptance Model (TAM) of Davis (1986), which emphasized the use of Theory of Reasoned Action (TRA). Theory of Reasoned Action, according to Davis, assumed that attitude of a person towards a system is controlled by his/her belief on that system. Similarly, Technology Acceptance Model also deals with the acceptability of an information system Adeyemo *et al* (2013) and how it can be applied to determine level of acceptability of the system. Furthermore, TAM model assumes that level of acceptability or actual use (AU) is mainly determined by two factors, namely; Perceived Usefulness (PU); and Perceived Ease of Use (PEU). The Perceived Usefulness (PU) of a system can be described as the level to which an individual believe that using the new technology or system will boost his/her performance (Bhatti 2015), while Perceived Ease of Use (PEU) refers to the extent to which a person believes that making use of a particular

system or technology to perform a task will be easier or require little effort (Lu *et al.,* 2014). Moreover, Davis (1986), through his TAM model, clarified that an individual's attitude towards a system is not the only factor that influences him/her to use the system, the effect that the system will have on the person's performance is another significant factor that determines level of acceptance. Several studies (Shen *et al*., 2006; Padilla-MeléNdez *et al*., 2013; Calisir *et al*., 2014; Teo & Noyes 2014; Ayeh 2015) have used Technology Acceptance Theory to explain users' acceptance and use of instructional and web based systems, including E-learning. For instance, Shen *et al* (2006) examined the degree to which subjective norms influence the perception of students towards accepting and using course delivery modes. Findings of the study revealed that facilitators' influence had significant impact on the students' perceived usefulness (PU). This finding revealed the impact of facilitators' role in shaping the perception of students learning delivery system. Similarly, study conducted by Bhatti (2015) on factors influencing the adoption of mobile commerce revealed that user's willingness to use mobile commerce platforms is influenced significantly by perceived ease of use (PEU) and perceived behavioural control. Therefore, the current study found relevance of TAM as an important predictor of pre-service teacher's attitude towards E-learning resources.

2.3 Empirical Studies

2.3.1 Pre-service teachers accessibility to e-learning resources

Sunday, (2017) investigated the electronic information (e-information) seeking behaviour of pre-service teachers in an Open and Distance Learning (ODL) programme. Survey research design was employed to carry out the study. Two hundred and thirty eighty (238) undergraduate students studying to obtain Bachelor of Education (B.Ed.) by distance were sampled from Ibadan Study Centre of the institution. The results from the survey revealed that electronic resources in different forms like radio, e-journals, e-books, and CD-ROM, among others, are available and accessible to the pre-service teacher trainees by distance. However,

limited internet connectivity and inadequate access to electricity were shown as major factors constraining most of the respondents from accessing and utilizing the available electronic resources. The study further revealed that most of the pre-service teacher trainees sampled did not have sufficient I.T. knowledge and competence in accessing the available electronic resources and prefer contracting most of their online assignments out to cybercafé operators and peers with better IT skills. The study, therefore, recommended, among others, compulsory face-to-face ICT training on the techniques of accessing and using electronic resources for first year students undergoing initial teacher education programme by distance for them to acquire necessary skills and competencies required to access and use electronic resources. The present study is the same with this empirical work based on pre-service teachers' access to E-learning resources and differ in utilization of E-learning resources by pre-service teachers.

Sunday *et al.* (2017) investigated assess of pre-service teacher trainees by distance learning and utilization of E-Learning resources: This study investigated pre-service teacher trainees by distance and the utilization of e-learning resources. A survey research design was used to carry out the study. One hundred and forty four (144) pre-service teachers by distance from three institutions offering teacher training programmes by distance in South Africa completed the anonymous web based survey designed to gather data which provide answers to the five (5) research questions in the study. The results revealed a high utilization of e-resources to learn but a low utilization of e-resources to teach among the respondents. The study recommends institutional based training on the techniques of accessing and utilizing e-learning resources for pre-service teacher trainees in ODL institutions. This present study is the same with this empirical work based on pre-service teachers learning through E-learning resources and differ in terms of pre-service utilization of E- learning resources.

Owate and Donald (2018) examined the relationship between accessibility and utilization of e-learning resources and achievement of academic goals. The paper adopted correlational study

design. The population of the study comprised of undergraduate students of the University of Port Harcourt, Rivers State, Nigeria. The finding showed that there is indeed a relationship between accessibility and utilization of e-learning resources and achievement of academic goals. It was therefore, recommended that efforts should be made by educationists and managements of higher institutions to provide adequate e-learning resources to aid learning. The present study is the same with the empirical study in terms of accessibility of E-learning resources and differs in terms of utilization of E-learning resources.

2.3.2 Pre-service teachers attitude to e-learning resources

Oparah *et al.* (2017) investigated pre-service teachers' attitude towards application of Information and Communication Technology (ICT) as a pedagogical tool in teacher education. A sample of 365 of pre-service teachers of Alvan Ikoku Federal College of Education, Owerri, Imo State, Nigeria was used for the study. The descriptive survey research design was adopted in carrying out the study. A 4-point type of questionnaire titled "Pre-service Teachers' Attitude towards ICT Application Scale (PSTAICTAS)" was used to generate data. It had reliability coefficient (r) of .76 determined using Pearson's product moments correlation coefficient formula. The data generated was analyzed using mean and standard deviation to answer the research question while the hypothesis was tested using t-test statistical tool at 0.05 level of significance. The result of the study revealed that pre-service teachers had positive attitude towards ICT as a pedagogical tool irrespective of their gender. Based on the findings, it was recommended that educators in teacher training institutions should apply ICT tools in their lecture delivery to enable pre-service teachers benefit from it. The present study is the same with this empirical study in in terms of pre-service teachers attitude towards the application of

technology as a pedagogical tool in teacher education and differs in in terms of pre-service teachers level of accessibility of E-learning resources.

Olga (2014) investigated the Students' Attitude Toward the use of E-Learning in Girne American University. This study focuses on the factors that would examine the students' attitude towards E-learning and its effectiveness in successful use. The technology acceptance model (TAM) is used in the analysis as a conceptual research framework of E-learning adoption. This paper intends to investigate factors affecting the student's attitude towards the use of the E-learning system at Girne American University (GAU) in North Cyprus. The responses of 133 students from more than 15 different departments on the online questionnaire are analyzed, and the result shows that students are interested and satisfied to use the E-learning system, in turn, the result suggests increasing the awareness of faculty members about the necessity of integrating E-learning in the educational process Learning. The present study is the same with this empirical study based students' attitude toward E-learning and differs in terms of accessibility of E-learning resources.

Abdelrahim *et al.* (2016) examine attitudes of UBT students' in Dahban and Sari campuses of University of Business and Technology Saudi Arabia towards e-learning by taking (371) students from four colleges and English language center. In sampling techniques, they used the stratified random sampling in choosing the study sample. To, gather the primary data from respondents, a well-structured questionnaire, developed by the researchers. The findings indicated that UBT participants owns a high standard on attitude towards e-learning and their attitude results significantly vary with their gender, technology usage and skills. The present study is the same with this empirical study in terms of students' attitude to E-learning and differ in terms of accessibility to E-learning resources.

Roumiana *et al.* (2018) determined factors affecting students' attitudes towards online learning. They determine the attitudes and perspectives of 590 undergraduate students of the Sofia University Bulgaria towards online learning and distance education. The main aim of the study is to determine the influence and dependencies of different factors on the attitudes of the students to online learning and distance education. The interrelations between students' attitudes and their demographics, the experience of using the technologies in everyday life and the experience of using technologies in an educational context are analysed. Conclusions drawn would be useful for the academic community and everyone concerned with the planning, development and implementation of strategies for online learning and distance education in a campus based university in a transition to distance educations. The present study is the same with this empirical study in terms of students attitude to E-learning resources and differs in terms of pre-service teachers accessibility level to E-learning resources.

Lau and Woods (2015) investigated on user perception and attitudes towards learning objects. This study empirically evaluated the technology acceptance model drawn from literature on Information Systems (IS) to investigate how user beliefs and attitudes influence learning-object use among higher education learners. The findings clearly showed that an individual's attitude towards the use on the learning object is significantly influenced by the individual's perception about ease of use and usefulness. User perceptions of usefulness had an even stronger influence on attitudes than user's perceptions of the learning objects ease of use Judged by its direct relationship to attitude and behavioral intention to use perceived usefulness was found to be the most significant factor influencing the user's acceptance of learning objects. At the same time behavioral intention to use the learning objects was highly related to the attitude and perceived usefulness. The present study is the same with this empirical study in terms of students' attitude to learning objects and differs in terms of students accessibility to E-learning resources.

Kisanga (2016) examine the determinants of teachers' attitudes towards e-learning in Tanzanian higher learning institutions. The study involved 258 teachers from 4 higher learning institutions obtained through stratified, simple random sampling. Questionnaires and documentary review were used in data collection. Data were analysed using statistical package for the social sciences (SPSS). Chi-square was performed to examine the association of variables. It was found that teachers have positive attitudes towards e-learning where computer exposure played a statistically significant contribution to their attitudes. It is recommended that training in e-learning needs to be provided to teachers to widen their understanding of e-learning. There is also a need to strengthen factors associated with teachers' positive attitudes towards e-learning. Results from this study are of particular importance to both teachers and the education stakeholders in Tanzania. The present study is the same in terms of attitude to E-learning and differs in terms of accessibility to E-learning.

Abdulai and Dzakpasu (2020) found out the attitude and perception of tutors (APT) in college of education tutors towards the use of ICT in teaching and learning process. The research method employed was a cross-sectional survey. In all 198 tutors were randomly selected from a stratified 5 zones of the colleges of education in Ghana. The collected data were analyzed using IBM version 23 of the statistical social science package (SPSS). T-test and descriptive statistics were use analyse the data. The results of the study indicate that generally college of education tutors have high attitude and perception towards the use of ICT in teaching and learning process. The findings further show that no significant difference between the attitude of male and female tutors towards the use of ICT in teaching and learning process. Again, the research reveals that there was no significant difference between the attitude if ICT tutors and non-ICT tutors. The present study is the same in terms of attitude towards the use of technology for teaching.

2.3.3 Gender effects on pre-service teachers towards e-learning resources

Ramirez-Correa *et al.* (2015) evaluated Gender and Acceptance of E-Learning: The study was carried out with participating students in two different universities, one in Chile and one in Spain. The Technology Acceptance Model was used as a theoretical framework for the study. A multi-group analysis method in partial least squares was employed to relate differences between groups. The four main conclusions of the study are: (1) a version of the Technology Acceptance Model has been successfully used to explain the process of adoption of e-learning at an undergraduate level of study; (2) the finding of a strong and significant relationship between perception of external control and perception of ease of use of the e-learning platform; (3) a significant relationship between perceived enjoyment and perceived ease of use and between results demonstrability and perceived usefulness is found; (4) the study indicates a few statistically significant differences between males and females when adopting an E-learning platform, according to the tested model. The present study is the same with this empirical studies in terms of gender difference of Pre-service teachers when adopting E-learning platform.

Owate *et al.* (2017) examine the impacts of age, gender, class level availability, accessibility, and human resources as independent variables in the use of e-learning resources were determined. Six research questions and hypotheses each were validated or invalidated depending upon the respondents results. Linear regression, t-test and multiple regression analyses were employed as statistical tools. It was discovered that there are immense influences of some demographic independent variables such as age, gender, availability, accessibility, and human resources in the use of e-learning resources in public secondary schools in Rivers State. Besides availability and accessibility were major contributors to the associated relationships in the use of e-learning resources. Equally needful are human resources and students' skills. There was contrast distinction between class level and other independent variables since it had no significant effect on the use of e-learning resources within the domain for public schools in Rivers State. The present study is the same with this

empirical study in terms of gender difference and accessibility of E-learning resources and differs in terms of attitude of students towards E-learning resources.

Jorge *et al.* (2018) examine gender differences and the adoption of technology in higher education students. TAM model is the tool used to measure the acceptance and use of e-learning of the respondents. They used Partial Least Squares (PLS), specifically; the PLS multi-group analysis was used to compare differences between groups. Results show that students' behaviour of acceptance of e-learning technology does not affect their performance. The present study is the same with this empirical study in terms of gender difference of higher education students towards the use of E-learning resources.

Gunamala and Sneha (2013) investigate the impact of gender on attitude towards computer and E-learning. This study aims to understand the relationship between gender and attitude towards e-learning. Literature shows that gender plays a key role in understanding the differences in perception towards usefulness of technology and ease of use but with regards to attitude and perception towards e-learning diverse views have been presented. This paper analyses the effect of gender on attitude towards computer technology and e-learning collectively. It also analyses the impact of gender on the usage of the basic e-learning forms like uploading/downloading course content, interactive videos and pod casting. A questionnaire was developed to collect the necessary data. Scale on Computer and e-learning attitude (SCAELA) was constructed and validated. In this study 477 students enrolled in various courses across many departments in Panjab University Chandigarh were analyzed. The results showed that no significant relationship exists between gender and attitude towards computer and e-learning. The usage of various e-learning forms also showed no significant difference base on gender on the perception of the challenges faced towards the use of E-learning resources. The future developments in e-learning can take note of this finding while developing e-learning tools which are efficient. The present study is the same with this

empirical study in terms of gender and attitude of students towards e-learning resources and differs in terms of accessibility of pre-service teachers' towards E-learning resources.

Muoneke and Muoneke (2019) aimed to highlight challenges that hinder effective application of e-learning in chemistry education programme in colleges of education. A survey research design was adopted and a sample size of six (6) chemistry lecturers, sixty (60) chemistry students from chemistry education department and the three (3) computer technology staff from ICT unit in the federal college of education Obudu were studied. Structured questionnaires which was face validated by two experts were administered to the sample. Based on the analysis of the result, findings revealed that technical, power shortage, storage facilities, e-learning course content and structure, insufficient fund, awareness and the manipulation of both e-learning tools and chemistry education programme were the major challenges faced by teacher on e-learning resources. Base on the findings, recommendations were made.

2.4 Summary of the Reviewed Literature

The reviewed literature conceptualized Pre-service Teachers' Accessibility and Attitude Towards E-learning Recourses for Teaching of Chemistry in Colleges of Education in Niger State. Constructivism theory and Technology acceptance model were discussed in the study. Empirical studies on the following headings were reviewed; Pre-service Teachers Accessibility to E-learning Resources, Pre-service Teachers Attitude to E-learning Resources, and Gender Effects on Pre-service Teachers Towards E-learning Resources.

It was revealed from the literature reviewed that pre-service teachers have both positive and negative attitude towards accessibility of E-learning resources. It also shows no significant difference between male and female students as well as there was significant difference between male and female students opinion on challenges faced by students when accessing E-

learning resources. Due to the abstract nature of chemistry and consistent phobia from most student on their constant poor performance, the researcher expands on pre-service teachers accessibility and attitude towards E-learning resources, taking into consideration gender as a moderating variable on how male and female access E-learning resources, their attitude towards the use of E-learning resources for teaching of chemistry and their different opinions on the challenges faced while accessing E-learning resources.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Design

The research design adopted for this study was descriptive survey; the choice of the research design was to seek an understanding in other to document current condition that exists at the moment. The study therefore discovered current situations as they relate to Pre-service Teachers' Accessibility and Attitudes towards E-learning resources for teaching Chemistry in Colleges of Education in Niger State.

3.2 Population of the Study

The population of interest is chemistry students of Colleges of Education in Niger State; namely: Niger State College of Education Minna and Federal College of Education Kontagora. The total population of the study was 3500 Pre-service teachers from the two Colleges of Education (1728 males and 1772 females).

Table 3.1 Distribution of Pre-service Chemistry teachers in Colleges of Education in Niger State

Colleges of Education	No. of Male	No. of Female	Total
Federal College of Education Kontagora	1140	976	2116
College of Education Minna	588	796	1384
Total	1728	1772	3500

Source: Heads of Department Chemistry (2020/2021 academic session)

3.3 Sampling and Sampling Technique

The sample size for the study was made up of 350 NCE III Chemistry Students of Niger State Colleges of Education Minna. The sample is in accordance with Krejcie and Morgan (1970) sample size determination table. Simple random sampling technique was used for the selection of the 350 Pre-service Chemistry teachers (167 males and 183 females).

3.4 Research Instruments

The research instruments used in this study were questionnaires titled "Questionnaire on Pre-service Teachers Accessibility to E-learning Resources for teaching of chemistry" (QOPTATER) and Questionnaire on Pre-service Teachers Attitude towards E-learning Resources for teaching of chemistry (QOPTATOER). The instruments were constructed by the researcher using all the variables of the study and concepts which are relevant components of the study.

The first instrument (QOPTATER) consists of three sections (sections A, B and C). Section A was used to collect demographic data (bio-data) of the respondent's while sections B and C contains the question items that the respondents are expected to answer so as to express their opinions. The section B of the questionnaire was a 4-points Likert type scale of Highly Available (HA), Moderately Available(MA), Less Available (LA) and Not Available (NA) with a corresponding weighing of: Highly Available (HA) = 4, Moderately Available (MA) =3, Less Available (LA) =2 and Not Available (NA) =1. Also, section C of the instrument was a 4-points Likert scale of Very Often (VO), Moderately Often (MO), Less Often (LO) and Not At All (NAA) with a corresponding weighings of: Very Often (VO) = 4, Moderately Often (MO) = 3, Less Often (LO) =2 and Not at All

(NAA) =1. A grand mean score of 2.5 was used as a decision rule for the items in sections B and C of this instrument.

The second instrument (QOPTATOER) consists of two sections (sections A and B). Section A was the demographic data (bio-data) of the respondent's while section B contains the question items that the respondents are expected to answer so as to express their opinions on attitude towards accessing E-learning resources. The section B of the questionnaire was a 4-points Likert type scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) with a corresponding weighing of: Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) =2 and Strongly Disagree (SD) =1. A grand mean score of 2.5 was used as a decision rule for the items in this section of the instrument

3.5 Validity of the Research Instrument

Validity refers to how well an instrument measures what it is intended to measure (Taherdoost, 2016). The research instruments were validated by two experts. One of the experts is a senior lecturer from Science Education Department and the second expert is a senior lecturer from Educational Technology Department, Federal University of Technology Minna. The instruments were subjected to face and content validity by these experts. These experts were requested to examine the items of the instrument whether the item statements are simple and unambiguous. The experts' observations, corrections and suggestions on the appropriateness, clarity as well as simplicity and suitability were taken into considerations. The outcome of the validity provides further basis for refining the instrument before producing the final copy for the study.

3.6 Reliability of Research Instruments

Reliability is the degree to which an instrument produces stable and consistent result (Muijs, 2011). To determine the reliability of the instruments, thirty (30) Students from Federal College of

Education Kontagora were used for the pilot studies. Federal College of Education Kontagora is part of the population of study but not part of the sampled school for the study. The Pre-service teachers were given the questionnaires (QOPTATER) and (QOPTATOER). The questionnaires were filled by the Pre-service teachers and returned to the researcher. The filled questionnaires were scored by the researcher and the results obtained were analysed using Cronbach alpha and a statistical coefficient of 0.926 and 0.826 were obtained. The values obtained shows that, the instruments are reliable and can be used for the study.

3.7 Method of Data Collection

Two persons were trained as research assistants by the researcher on the rudiments of data collection as regarding this study. Then, the researcher collected an introductory letter from Science Education Department, Federal University of Technology, Minna. The researcher presented the letters to the appropriate authorities in all the two Colleges of Education in Niger State, in order to seek permission to have access to the Pre-service chemistry teachers of the Colleges of Education. Once the permission was granted, the researcher gave proper orientation to all the respondents on the objectives of the study and how to fill the questionnaires to ensure that valid data were collected. Thereafter, the researcher and the trained research assistants administered the questionnaires on the respondents using face to face method. The researcher and the research assistants waited and collected the filled questionnaires from the respondents on the same day. This is to control the risk of mortality (failure or refusal of some Pre-service teachers to return the filled questionnaires) which could be a threat to the internal validity. The research work lasted for six weeks (one week for permission, introduction and orientation while the second, third, fourth, fifth, and sixth weeks, were used for data collection).

3.8 Method of Data Analysis

Data obtained from the study were analyzed using descriptive statistics. The research questions were answered using the descriptive statistics of mean, standard deviation and percentages which will be further expressed using bar charts, while the hypotheses were tested using Mann Whitney (U-test)**.** This is because the entire hypothesis sought to find difference between two variables. The Statistical Package for Social Science (SPSS) version 23.0 was used for the analysis.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

The study investigated pre-service teachers' accessibility and attitude towards E-learning resources for teaching of chemistry in colleges of education in Niger State. This chapter deals with data analysis and presentation of results. The results were presented based on the demographic data, stated research questions, and formulated hypotheses. The chapter also deals with summary of findings and discussion of results.

4.1 Presentation of Result

The findings from the data for the study were presented under the following,

i. Demographic data

ii. Research questions

iii. Testing of Hypotheses

4.1.1 Demographic Data

In this section the demographic data are presented, showing the distribution of the sample size in terms gender and the results is presented in Table 4.1.

Table 4.1 Distribution of Respondents by Gender

Gender	Frequency	Percentage (%)
Male	167	47.7
Female	183	52.3
Total	350	100.0

From table 4.1, shows the distribution of the sample size based on gender. 167 of the respondents representing 47.7% were males, while 183 of the respondents representing 52.3% of the total respondents were females. This shows that, there were more female respondents in the population of the study.

4.1.2 Answering Research Questions

Research Question One: What are the E-learning resources accessible in colleges of education in Niger State? To answer the research question, mean and standard deviation was used and the analysis is presented in Table 4.2

Table 4.2: Mean and Standard Deviation of Pre-service Teachers Accessibility of E-learning Resources in Colleges of Education in Niger State

S/No	Items	N	Mean	Std. Deviation	Remarks

1	Internet	350	3.51	.752	High Accessibility
2	E-journals	350	2.79	.843	High Accessibility
3	Search engines	350	2.81	1.013	High Accessibility
4	Full-text databases	350	3.02	.924	High Accessibility
5	Website	350	3.29	.843	High Accessibility
6	E-images	350	2.94	.908	High Accessibility
7	CD-ROMs	350	2.77	.947	High Accessibility
8	Reference databases	350	2.98	.911	High Accessibility
9	Institutional Repositories (IRs)	350	2.93	.924	High Accessibility
10	Computers/laptops	350	3.17	.952	High Accessibility
	Grand Mean	**350**	**3.02**	**0.90**	**High Accessibility**

Table 4.2 reveals the mean and standard deviation of colleges of education pre-service teachers' perceptions on the extent of e-learning resources accessibility. The average mean of a 4-point Likert scale was 2.50, therefore, a grand mean score of 2.5 was used as a decision rule for **'High Accessibility'** and a grand mean score of less than 2.50 is considered **'Low Accessibility.**' Consequently, all the ten (10) items listed, have mean scores which were between 2.77 and 3.51 which were above the benchmark of 2.50. This indicates that all the pre-service teachers in this population have access to e-resources for teaching chemistry. It is important to highlight that more respondents in this population perceive internet and websites were more accessible with the highest mean of 3.51 and 3.29, respectively. Consequently, the grand mean of 3.02 indicates

that Pre-service teachers in this population agree that there is high accessibility of E-learning resources for teaching chemistry.

Research Question Two: What is the attitude of Pre-service teachers towards accessing E-learning resources in colleges of education in Niger State? To answer the research question, mean and standard deviation was used and the analysis is presented in Table 4.3

Table 4.3: Mean and Standard Deviation of Pre-service Teachers Attitude towards Accessing E-learning Resources in Colleges of Education in Niger State

S/No		N	Mean	Std. Deviation	Remarks
1	I believe using E-learning will improve the quality of my work	350	3.54	.687	Positive
2	I prefer reading articles online	350	3.09	.787	Positive
3	I feel uncomfortable reading a textbook on a computer screen than a physical textbook	350	2.83	.985	Positive
4	Interaction with the computer system is often frustrating	350	2.55	1.000	Positive
5	Communicating through social networks is fun	350	3.04	.906	Positive
6	I like reading magazines on new technology innovations	350	3.27	.848	Positive
7	E-learning increases learners' social isolation	350	3.17	.913	Positive
8	I believe e-learning is very economical for educational institutions to adopt	350	3.26	.865	Positive
9	I find it interesting working with computers	350	3.17	.864	Positive
10	E-learning is a suitable alternative to the pen/paper based system	350	3.33	.858	Positive
	Grand Mean	**350**	**3.13**	**0.87**	**Positive**

Table 4.3 reveals the mean and standard deviation of Pre-service teachers' attitudes towards E-learning resources accessible. The average mean of a 4-point Likert scale was 2.50, therefore, 2.50 and above was used as the benchmark for **'Positive'** and the mean of less than 2.50 is

considered **'Negative.**' Consequently, all the ten (10) items listed, have mean scores which were between 2.55 and 3.54 which were above the benchmark of 2.50. This indicates that all the pre-service teachers' in this population have positive attitudes towards E-learning resources use for teaching chemistry. It is important to highlight that more respondents in this population perceive I believe using E-learning will improve the quality of my work and E-learning is a suitable alternative to the pen/paper based system were more attitude of the pre-service teachers' with the highest mean of 3.54 and 3.33, respectively. Consequently, the grand mean of 3.13 indicates that Pre-service teachers have positive attitudes towards E-learning resources for teaching chemistry.

Research Question Three: What is the gender difference in the attitude of Pre-service teachers towards accessing E-learning resources in colleges of education in Niger State? To answer the research question, mean rank and sum of ranks were used and the analysis is presented in Table 4.4

Table 4.4: Summary of Mean Rank and Sum of Ranks of Male and Female Attitude of Pre-service Teachers towards Accessing E-learning Resources

Group	N	Mean Rank	Sum of Ranks
Male	167	167.68	28002.00
Female	183	182.64	33423.00

Table 4.4 results, compares the change in Male and Female attitude of Pre-service Teachers towards Accessing E-learning Resources. The result shows that, the male and female students have mean rank values of 167.68 and 182.64 respectively, while the sum of ranks were 28002.00 and 33423.00 for male and female respondents, respectively. The female students have the

highest mean rank than the male students. Based on the result presented, there is no remarkable difference in the attitude of Pre-service Teachers towards Accessing E-learning Resources.

Research Question Four: What are challenges faced towards the use of E-learning resources for teaching chemistry in colleges of education in Niger State? To answer the research question, mean and standard deviation was used and the analysis is presented in Table 4.5

Table 4.5: Mean and Standard Deviation of Pre-service Teachers challenges faced towards the use of E-learning resources for teaching chemistry in colleges of education in Niger State

S/No		N	Mean	Std. Deviation	Remarks
1	Network downtime	350	3.15	.87	More Often
2	Slowness when downloading	350	2.98	.87	More Often
3	Vendor upgrades	350	2.94	.91	More Often
4	Slow computers	350	2.81	.97	More Often
5	Load-shedding	350	2.88	.95	More Often
6	Off-campus access problems	350	2.91	1.00	More Often
7	Lack of usage statistics	350	2.92	.99	More Often
8	High cost of subscription fees	350	3.03	1.03	More Often
9	Lack of ICT and E-learning literacy	350	2.89	1.03	More Often
10	Frequent electricity shortage	350	2.89	1.05	More Often
	Grand mean	350	2.94	0.97	More Often

Table 4.5 reveals the mean and standard deviation of Pre-service teachers' challenges faced towards the use of E-learning resources for teaching chemistry in colleges of education in Niger State. The average mean of a 4-point Likert scale (2.50) was used as the benchmark. Therefore, 2.50 and above was used as the benchmark for 'More Often' and the mean of less than 2.50 is considered 'Less Often.' Consequently, all the ten (10) items listed, have mean scores which were between 2.81 and 3.15 which were above the benchmark of 2.50. This indicates that all the pre-service teachers' opinion on the challenges faced towards accessing of E-learning resources for teaching chemistry was more often in this population. It is important to highlight that more respondents in this population perceive that the challenges of Network downtime and high cost of subscription fees were more often with the means of 3.15 and 3.03, respectively. Consequently, the grand mean of 2.94 indicates that Pre-service teachers are faced with challenges towards accessing E-learning resources in teaching of chemistry in colleges of education in Niger State.

Research Question Five: What are the challenges faced towards accessing of E-learning resources for teaching chemistry based on gender in colleges of education in Niger State? To answer the research question, mean rank and sum of ranks were used and the analysis is presented in Table 4.6

Table 4.6: Summary of Mean Rank and Sum of Ranks of Male and Female Pre-service Teachers' Opinion of the Challenges faced towards Accessing E-learning Resources

Group	N	Mean Rank	Sum of Ranks
Male	167	176.51	29477.50
Female	183	174.58	31947.50

Table 4.6 results, compares the change in Male and Female Pre-service Teachers opinion on the challenges faced towards the use of E-learning resources for teaching chemistry. The result shows that, the male and female pre-service teachers have mean rank values of 176.51 and 174.58respectively, while the sum of ranks were 29477.50.00 and 31947.50 for male and female respondents, respectively. The male Pre-service Teachers have the highest mean rank than the female Pre-service Teachers. Based on the result presented, there is no remarkable difference in the Opinion of the Challenges faced towards Accessing E-learning Resources.

Research Question Six: What is the male and female pre-service teachers' perception of the extent of E-learning resources accessible in colleges of education in Niger State based on gender? To answer the research question, mean rank and sum of ranks were used and the analysis is presented in Table 4.7

Table 4.7: Summary of Mean Rank and Sum of Ranks of Male and Female Pre-Service Teachers' Perception of the Extent of E-Learning Resources Accessible

Group	N	Mean Rank	Sum of Ranks
Male	167	161.84	27026.50
Female	183	187.97	34398.50

Table 4.7 results, compares the change in male and female Perception of the Extent of E-Learning Resources Accessibility of Pre-service Teachers. The result shows that, the male and female pre-service teachers have mean rank values of 161.84 and 187.97respectively, while the sum of ranks were 27026.50 and 34398.50 for male and female respondents, respectively. The female pre-service teachers have the highest mean rank than the male students. Based on the result

presented, there is remarkable difference in the Perception of the Extent of E-Learning Resources Accessible to Pre-service Teachers in colleges of education in Niger State.

4.1.3 Testing of Null Hypotheses

Null Hypothesis One: There is no significant difference between male and female Pre-service teachers' extent of accessing E-learning resources in colleges of education in Niger State? This null hypothesis was analyzed using Man Whitney (U-test) at **α** =0.05 and the analysis is presented in Table 4.8

Table 4.8: Summary of Mann Whitney (U-test) Analysis between male and female pre-service teachers on the Extent of accessing E-learning resources

Group	**N**	**Mean Ranks**	Sum of Ranks	**U**	**P**	**Remark**
Male	167	161.84	27026.50			
Female	183	187.97	34398.50	12998.50	0.016	Significant

Significant at $p < 0.05$

The result in Table 4.8 compares the male and female Pre-service teachers' extent of accessing E-learning resources. The result shows that, the male and female pre-service teachers' have mean rank values of 161.84 and 187.97 respectively, while the sum of ranks were 27026.50 and 34398.50 for male and female respondents, respectively. The MannWhitney (U-test), U = 12998.50, P = (0.016), $P < 0.05$. This indicates that, there was a significant difference in the extent of accessing E-learning resources. Thus, HO_1 was rejected, since the p-value of 0.016 is less than the α-level of 0.05 ($P < 0.05$).

Null Hypothesis Two: There is no significant difference between male and female Pre-service teachers' attitudes towards accessing E-learning resources in colleges of education in Niger State? This null hypothesis was analyzed using Man Whitney (U-test) at **α** =0.05 and the analysis is presented in Table 4.3

Table 4.9: Summary of Mann Whitney (U-test) Analysis between male and female pre-service teachers attitude towards accessing E-learning resources

Group	**N**	**Mean Ranks**	Sum of Ranks	**U**	**P**	**Remark**
Male	167	167.68	28002.00			
Female	183	182.64	33423.00	13974.00	0.17	Not Significant

Significant at p < 0.05, a. Grouping Variable: GENDER

The result in Table 4.9 compares the male and female Pre-service teachers' attitudes toward accessing E-learning resources. The result shows that, the male and female pre-service teachers have mean rank values of 167.68 and 182.64 respectively, while the sum of ranks were 28002.00 and 33423.00 for male and female respondents, respectively. The MannWhitney (U-test), U = 13974.00, P (0.17) > 0.05. This indicates that, there is no significant difference in their attitudes toward accessing E-learning resources. Thus, HO_2 was accepted, since the p-value of 0.17 is greater than the α-level of 0.05 (P > 0.05).

Null Hypothesis Three: There is no significant difference between male and female Pre-service teachers' perception of the challenges faced towards the use of E-learning resources for teaching chemistry in colleges of education in Niger State. This null hypothesis was analyzed using Man Whitney (U-test) at **α** =0.05 and the analysis is presented in Table 4.10

Table 4.10: Summary of Mann Whitney (U-test) Analysis between male and female perception of the challenges faced towards the use of E-learning resources

Group	**N**	**Mean Ranks**	Sum of Ranks	**U**	**P**	**Remark**
Male	167	176.51	29477.50			
Female	183	174.58	31947.50	15111.500	.858	Not Significant

Significant at $p < 0.05$, a. Grouping Variable: GENDER

The result in Table 4.10 compares the male and female Pre-service teachers' perception of the challenges faced towards the use of E-learning resources. The result shows that, the male and female pre-service teachers' have mean rank values of 176.51 and 174.58 respectively, while the sum of ranks were 29477.50 and 33423.00 for male and female respondents, respectively. The Mann Whitney (U-test), U = 31947.50, P (0.858) > 0.05. This indicates that, there was no significant difference in their perception of the challenges faced towards the use of E-learning resources. Thus, HO_3 was accepted, since the p-value of 0.858 is greater than the α-level of 0.05 ($P > 0.05$).

4.3 Summary of Findings

The study investigated accessibility and attitude of Pre-Services Teachers' towards the use of E-learning resources in teaching of chemistry in Colleges of Education in Niger State. The results from data analysis yielded the following findings:

1. The result in research question one shows that the respondents in this population all have access to E-resources for teaching chemistry. The findings also revealed that internet and websites were more accessible E-learning resources for teaching of chemistry in colleges of education in Niger State.

2. The findings indicated that all the pre-service teachers' in this population have positive attitudes towards E-learning resources use for teaching chemistry. It also highlighted that, more respondents in this population perceived using E-learning resources improve the quality of their work and also a suitable alternative to the pen/paper based system of teaching.
3. All the pre-service teachers' perception on the challenges faced towards accessing of E-learning resources for teaching chemistry were more often. It also revealed that Network downtime and high cost of subscription fees were more often challenges faced towards accessing of E-learning resources for teaching chemistry in colleges of education in Niger State.
4. There was a significant difference between male and female Pre-service teachers' extent of accessing E-learning resources in colleges of education in Niger State.
5. There was no significant difference between male and female Pre-service teachers' attitudes towards accessing E-learning resources in colleges of education in Niger State.
6. There was no significant difference between male and female Pre-service teachers' perception of the challenges faced towards the use of E-learning resources for teaching chemistry in colleges of education in Niger State.

4.4 Discussion of the Findings

There was a significant difference between male and female Pre-service teachers' extent of accessing E-learning resources in colleges of education in Niger State at P = (0.01), P< 0.05. This is contrary to the findings of Owate *et al* (2017) who examine the impacts of age, gender, class level availability, accessibility, and human resources as independent variables in the use of e-learning resources the findings revealed that, there was contrast distinction between class level, gender and other independent variables since it had no significant effect on the use of e-learning resources within the domain for public schools in Rivers State.

All the pre-service teachers' in this population have positive attitudes towards E-learning resources use for teaching chemistry. It also highlighted that, more respondents in this population perceived using E-learning resources improve the quality of their work and also a suitable alternative to the pen/paper based system of teaching. This is in support of the findings of Oparah *et al* (2017) who investigated pre-service teachers' attitude towards application of Information and Communication Technology (ICT) as a pedagogical tool in teacher education and The result of the study revealed that pre-service teachers had positive attitude towards ICT as a pedagogical tool irrespective of their gender. It was also in support of the findings of Kisanga (2016) who examine the determinants of teachers' attitudes towards e-learning in Tanzanian higher learning institutions and It was found that teachers have positive attitudes towards e-learning where computer exposure played a statistically significant contribution to their attitudes.

There was no significant difference between male and female Pre-service teachers' attitudes towards accessing E-learning resources in colleges of education in Niger State. This is in support of the findings of Abdulai and Dzakpasu (2020) who work to find out the attitude and perception of tutors (APT) in college of education tutors towards the use of ICT in teaching and learning process and The results of the study indicate that generally college of education tutors have high attitude and perception towards the use of ICT in teaching and learning process. The findings further show that no significant difference between the attitude of male and female tutors towards the use of ICT in teaching and learning process but in contrary to the findings of Abdelrahim *et al.* (2016) who examine attitudes of UBT students' in Dahban and Sari campuses towards e-learning The findings indicated that UBT participants' owns a high standard on attitude towards e-learning and their attitude results are significantly vary with their gender.

All the pre-service teachers' in this population have positive attitudes towards E-learning resources use for teaching chemistry. It also highlighted that, more respondents in this population perceived using E-learning resources improve the quality of their work and also a suitable

alternative to the pen/paper based system of teaching. This is in contrary to the findings of Muoneke and Muoneke (2019) aimed to highlight challenges that hinder effective application of e-learning in chemistry education programme in colleges of education and the findings revealed that technical, power shortage, storage facilities, e-learning course content and structure, insufficient fund, awareness and the manipulation of both e-learning tools and chemistry education programme were the major challenges faced by teacher on e-learning resources.

There was no significant difference between male and female Pre-service teachers' perception of the challenges faced towards the use of E-learning resources for teaching chemistry in colleges of education in Niger State. This is in support of the findings of Gunamala and Sneha (2013) who investigated the impact of gender on attitude towards computer and E-learning and the findings showed that no significant difference exists between gender and attitude towards computer and e-learning. The usage of various e-learning forms also showed no significant difference base on gender on the perception of the challenges faced towards the use of E-learning resources

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study assessed and examined pre-service teachers in colleges in Niger State, and from the findings of the study and the discussions that followed, the following conclusions were made:

All the pre-service teachers in colleges of education in Niger State have access to E-resources for teaching chemistry and internet and websites were the more accessible E-learning resources for teaching of chemistry in colleges of education in Niger State.

All the pre-service teachers' in colleges of Education in Niger State have positive attitudes towards E-learning resources use for teaching chemistry.

All the pre-service teachers' opinion on the challenges faced towards accessing of E-learning resources for teaching chemistry were more often while Network downtime and high cost of subscription fees were the more often challenges faced towards accessing of E-learning resources for teaching chemistry in colleges of education in Niger State.

There was a significant difference between male and female Pre-service teachers' extent of accessing E-learning resources in colleges of education in Niger State.

There was no significant difference between male and female Pre-service teachers' attitudes towards accessing E-learning resources in colleges of education in Niger State.

There was no significant difference between male and female Pre-service teachers' perception of the challenges faced towards the use of E-learning resources for teaching chemistry in colleges of education in Niger State.

5.2 Recommendations

Base on the findings of this study, the following recommendations were made:

1. The Colleges of Education authority should give priority in the provision of E-learning facilities through collaboration for effective teaching and learning to take place.

2. The Colleges should not relent on their own efforts through the use of Memorandum of Understanding with international bodies and multinational organization in the provision of e-learning facilities in order to achieve educational goals as stated in national policy of education.

3. Usage of E-learning facilities should be mandated on in-service teachers' as it will assist the teachers to shift from traditional methods of teaching to new pedagogy which will enable the students to see themselves as knowledge generator and active participants.

4. Colleges of Education should encourage their lecturers in the use of e-learning facilities for teaching and learning of chemistry through regular training.

5. The government at all levels should provide funds and a conducive environment for the availability and accessibly of E-learning resources in colleges of education in Niger State.

6. Stakeholders and NGOs should regularly organize or sponsor pre-service teacher on the accessibility and usage of E-learning resources

7. Curriculum planners should incorporate Mandatory usage of E-learning resources in the curriculum so as to increase the level of accessibility of both in-service and pre-service teachers on E-learning resources as well as changing their perceptions on the accessibility

and attitude toward E-learning resources for teaching chemistry in colleges of education in Niger State.

8. The Government in collaboration with the network providers should work hand in hand to ensure improvement of internet network services and also to reduce cost of subscription.

5.3 Contributions to Knowledge

1. The study revealed that, pre-service teachers in Colleges of Education in Niger State all have access to E-resources for teaching chemistry.
2. The study revealed that, pre-service teachers in Colleges of Education in Niger State all have positive attitudes towards E-learning resources use for teaching chemistry.
3. The study revealed that, all the pre-service teachers in Colleges of Education in Niger State perception on the challenges faced towards accessing of E-learning resources for teaching chemistry such as network downtime and high cost of subscription were more often.
4. The study revealed that, there was no significant difference between male and female Pre-service teachers' attitudes towards accessing E-learning resources for teaching of chemistry in colleges of education in Niger State.
5. The study developed an instrument that could be used for future researches in this area of study.

5.4 Limitations of the Study

This study was carried out in colleges of education in Niger State and it was focused of pre-service teachers' accessibility and attitude towards E-learning resources for teaching of chemistry. The study has successfully determined the level of accessibility of pre-service teachers to E-learning

resources as well as the pre-service teachers' attitude towards the use of E-learning resources. However, the study has some limitations which includes:

1. Some pre-service teachers in this population has no teaching experience as they have not undergone their Teaching Practice Program but rather filled the questionnaires based on assumptions.
2. Inability of some respondents to express their perceptions but rather copying from friends.
3. The researcher's dependent on the research assistant for some aspects of data collection which was due to poor road network and insecurity.

5.5 Suggestions for Further Study

1. This study could be replicated in North-Central, Nigeria to give room for more generalizations.
2. Similar studies should be carried out in other science courses such as physics and biology.

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Appendix A

Department of Science Education

School of Science and Technology,

Federal University of Technology.

Minna.

LETTER OF INTRODUCTION

Dear Participant, I am a M.TECH student at Federal University of Technology Minna, carrying out a research on "Pre-service Teachers' Accessibility and Attitude towards E-learning Resources for Teaching of Chemistry in Colleges of Education in Niger State. I would really appreciate your cooperation by completing this questionnaire. It should take you about 15 to 20 minutes to complete. Be assured that you will remain anonymous and your response will be treated with absolute confidentiality. Please be assured that no school or individual will be identified in any report of published findings.

SECTION A: BIO-DATA INFORMATION

Instruction: Kindly tick the appropriate option.

1. Gender: Male ☐ Female ☐

SECTION B

Please rate how much of the following E-learning Resources are accessible using the scale: Highly Accessible (HA), Moderately Accessible (MA), Less Accessible (LA), and Not Accessible (NA)

S/N	ITEMS	HA	MA	LA	NA
1	Internet				
2	E-journals				
3	Search engines				
4	Full-text databases				
5	Website				
6	E-images				
7	CD-ROMs				
8	Reference databases				
9	Institutional Repositories (IRs)				
10	Computers/laptops				

SECTION C

Please rate the challenges faced towards the use of the following E-learning resources using scale: Very often (VO), Moderately often (MO), Less often (LO), Not At All (NAA)

S/N	ITEMS	VO	MO	LO	NAA
1	Network downtime				

2	Slowness when downloading				
3	Vendor upgrades				
4	Slow computers				
5	Load-shedding				
6	Off-campus access problems				
7	Lack of usage statistics				
8	High cost of subscription fees				
9	Lack of ICT and E-learning literacy				
10	Frequent electricity shortage				

SECTION A: BIO-DATA INFORMATION

Instruction: Kindly tick the appropriate option.

1. Gender: Male ☐ Female ☐

SECTION B: Attitudes towards Accessing E-Resources

Please rate how much you agree/disagree with each statement using the scale: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD)

S/N	ITEMS	SA	A	D	SD
1	I believe using e-learning will improve the quality of my work				
2	I prefer reading articles online				
3	I feel uncomfortable reading a text book on a computer screen than a physical text book				
4	Interaction with the computer system is often frustrating				
5	Communicating through social networks is fun				
6	I like reading magazines on new technology innovations				
7	E-learning increases learners' social isolation				
8	I believe e-learning is very economical for educational institutions to adopt				
9	I find it interesting working with computers				
10	E-learning is a suitable alternative to the pen/paper based system				

APPENDIX B

Reliability

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.926	20

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.826	10