LECTURERS' AWARENESS, ATTITUDE AND PERCEPTION TOWARDS THE UTILIZATION OF CLOUD-BASED LEARNING ENVIRONMENT IN TERTIARY INSTITUTIONS IN KEBBI STATE, NIGERIA

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ABSTRACT

This study investigated lecturers' awareness, attitude and perception towards the utilization of cloud-based learning environment in tertiary institutions in Kebbi State. The study adopted descriptive survey research design. A stratified sampling technique was used to select 160 lecturers that constituted the sample of this study. Structured designed questionnaire comprising of four sections was used for data collection. The instrument was subjected to validation and reliability checks. The instrument was administered once and Cronbach Alpha formula was used to determine the internal consistency of the items. Reliability coefficients of 0.85 for awareness, 0.92 for attitude and 0.84 for perception were obtained. Six research questions were raised and six corresponding null hypotheses were formulated and tested at 0.05 alpha level of significance. Data gathered were analyzed using mean, standard deviation, t-test and Analysis of Variance (ANOVA). The results showed P=0.313, hence there was no significant difference in the level of awareness of lecturers on the existence of Cloud Based Learning Environment for teaching base on their years of experience, P=0.99, hence there was also no significant difference between male and female lecturers' awareness of the existence of Cloud Based Learning Environment for teaching. Also, P=0.23 which showed that there was no significant difference in lecturers' attitude of Cloud Based Environment Learning for teaching based on their years of experience. Also, P=0.18 hence, there was no significant difference between male and female lecturers' attitude towards the use of Cloud Based Learning Environment for teaching. Furthermore, P=0.638 hence there was no significant difference in lecturers' perception towards the utilization of Cloud Based Learning Environment for teaching base on their years of experience. Findings also shows that P=0.99 hence, there was no significant difference between male and female lecturers' perception towards the utilization of Cloud-Based Learning Environment for teaching. It was thus, recommended that lecturers should use cloud-based learning environment in tertiary institutions in Kebbi State. It was further recommended that government should make funds available to schools to enhance the use of cloud-based learning environment across the country.

TABLE OF CONTENTS

CHAPTER TWO

CHAPTER THREE

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDIX

Appendix **Pages**

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

Education is one of the most important components of life and it is hard to imagine continuing life in the twenty-first century without acquiring the basic education needed to live in the digital world. It is the process of receiving or giving systematic instruction, especially at a school or university. With the rapid pace of development brought by Information Technologies (IT), students are enabled to access any knowledge and information required in a compact and effective way and over a short span of time. As a result of this pedagogy of learning and teaching, there is a massive redefinition on use of Information and Communications Technology (ICT) in the 21st century classroom instruction, however Information and Communication Technology (ICT) in education is the mode of education that use information and communications technology to support, enhance, and optimize the delivery of information (Dahlman, 2007).

In the first quarter of 21st century, many countries are changing the way they provide education in their educational institutions through deploying new technologies and applications brought by such technologies. “In fact, technology is the driving force behind most development and innovations applied in educational environment” (Dahlman, 2007). Technology can give educational institutions new opportunities for teaching and learning, it can bring about new platforms and paradigms to collaborate; this in turn, can create and save money. Technology interacts with many variables: student preparation and motivation, how the student or instructors uses technology, and how well the environment supports learning (Spurlin, 2006). In the past few years, educational institutions in Nigeria have made efforts to use technologies such as computers, the Internet broadcasting technologies (radio and television), and telephone

to enhance the quality of education, According to United Nations report, ICT has been the platform of this change (Noor-Ul-Amin, 2013). “ICT regularly bring along diverse set of technological tools and resources that have impact on the education system” (Tinio, 2015). In more general terms, ICTs are basically information-handling tools; a varied set of goods, applications and services that are used to produce, store, process, distribute and exchange information. They include facilities such as radio, television, telephone, and computers, satellite and wireless technology and the internet services.

ICT tools are combined to form the ‘networked world’ as a massive infrastructure of interconnected telephone services, standardized computing hardware, the internet, radio and television, which reaches into every corner of the globe (Talebian, *et al.,* 2014). Use of cloud computing in the education system has recently groundswell at all levels and in both formal and non-formal settings. Undoubtedly, ICT has impacted on the quality and quantity of teaching, learning, and research in traditional and distance education institutions. “In concrete terms, cloud computing has enhanced teaching and learning through its dynamic, interactive, and engaging content; and it can provide real opportunities for individualized instruction” (Gaytos, 2012). In addition, cloud computing provides opportunities for schools to communicate with one another through email, mailing lists, chat rooms, and so on. It also provides quicker and easier access to more extensive and current information. Furthermore, it provides researchers with a steady avenue for the dissemination of research reports and findings (Yusuf, 2005). The use of cloud computing in education has intensely reformed learning and teaching processes. Moreover, it has expanded new opportunities for learning and accessing educational resources beyond the conventional model of electronic learning availability. “In prevailing paradigm, the use of cloud computing in education has created a new method of training called e-learning” (Vyasulu, 2014). E-learning is the most promising

technology in educational environment. It utilizes technologies to access educational information and course curriculum outside of the classroom. E-learning mostly refers to use of ICT in teaching and learning. There are many models of learning such as online learning, virtual learning, distributed learning, network learning and web-based learning. E-learning can also describe as one model of teaching and learning (Moore *et al.,* 2011). E-learning has evolved through recent years, and new generations of e-learning have brought new applications and tools along.

Today more and more academic institutions are using e-learning. The growth of e-learning is directly related to fast growing access of institutions and individuals to ICT. Although the cost of education is reduced through use of ICT, the fact remains that there are many new costs institutions are forced to pay. The biggest expense is the maintenance, upgrade, update, and renewing of the license in infrastructure (Chao *et al.,* 2015).

Amongst all the biggest advantage of using this technology is the time saved through the process. In e-learning, students can study anytime and anywhere. In such system students are not forced to be at the same place in a certain time to receive the teaching contents. The platform provides the opportunity to easily download their educational materials with no limitation in the schedule, time and time-table or location. In addition, the communication between students (collaboration learning) and lecturers are more and faster (Shopova, 2015). Although privileges and advantages of using technology in the education is not hidden to anyone, cost of acquiring and maintaining these technologies remains a determining factor in deciding the depth and scope of their usage. Many tertiary institutions are enthusiastic about using new technologies such as e-leaning in their educational environment, but the fear of the cost prevents them from doing so. Lack of facilities, resources, budget and IT specialists in tertiary institutions were

always serious challenges in developing countries (Tinio, 2015). To address this challenge faced by governments and institutions and to help them overcome this problem, the Cloud Base Computing concept was introduced. Cloud computing has provided a solution to budgets, student management, infrastructure maintenance and resources shortcomings, especially in educational institutes (Bora *et al.,* 2013).

Cloud computing refers to an e-learning which is an internet-based learning process, using internet technology to design, implement, select, manage, support and extend learning which can be accessible anywhere, anytime and on any computing device. Thus, will not replace traditional education methods, but will greatly improve the efficiency of education (Méndez *et al.,* 2011). Cloud computing is internet based, it provides lecturers with the ability to share the resources, software, application and information. Cloud-based services can be available free or with a quite lower-cost platform; students and staff can use it in their daily activities and because of the nature of cloud computing, the system is centralized and so much easier and faster to monitor and maintain. In addition to that, cloud computing technology has given many advantages in their communication and learning strategies to students and academic staff. Cloud computing according to its terms is the most appropriate way to improve teaching and learning by reducing implementation and maintenance costs of computer laboratories, increasing mobility of classroom and teaching materials, quick access to learning materials, and IT department transformation because of the cloud focuses on innovation and a focus on maintenance and implementation (Bora *et al.,* 2013), (Cenka *et al.,* 2013), (Chunwijitra, 2013).

In a developing country like Nigeria, ICT applications is far behind the developed world, although Nigerian people use technology in their daily life, almost non-stop; but, the level of technology and accessibility for the public in some aspects are lower than

standards in developed countries (Rahmanpoor *et al.,* 2009). Lecturers and students are compelled to attend the institutions computer laboratories to help them access or acquire the needed teaching and learning materials because sophisticated software and hardware are expensive and limited and not feasible for lecturers or students to afford due to their expensive nature.

Furthermore, to access e-library facilities requires that lecturers be physically present in the laboratories or library to get the materials for cloud base instruction. Another challenge was managing, editing and storing of lecturers and students' data and e-portfolio especially for those who don't have back-up and disaster recovery plan information system.

Tertiary institutions have to develop a system which can deliver ICT to provide more online resources and materials for their students, it should enable university and the lecturers to monitor and control all the activities and frames of study of students. It should also help to reduce the costs and give an equal chance to students who live in far and remote places (Trucano, 2015). Abedi (2015) mentioned that although using ICT tools in education is a new approach in developing countries, the usage of these tools in the past few years has increased rapidly.

Cloud computing is an emerging technology in Nigeria. Industries and government organizations are already using this technology in their system, although there are a lot of complains about the internet speed and availability of online materials in this system (Javan, 2015). However, tertiary institutions are far behind than other organizations especially in practicing the cloud computing service. Although e-learning is functional and popular in most of renowned tertiary institutions of Nigeria basing the e-learning system on cloud, it is still in its primary stages (Hossaini, 2015). Among Nigerian tertiary institutions only a few have implemented cloud services in their campuses and

others are reluctant to utilize the financial and practical advantages of such system in educational industry (Javan, 2015).

The impact of Covid-19 which led to the closure of universities in Nigeria in the year 2020, demonstrate that our educational system especially in Nigeria universities needs to adopt the use of cloud-based technology in order to compliment the traditional face-to-face teaching and learning process. In this dissertation, Lecturers' awareness, attitude and perception towards the utilization of cloud-based e-learning environment in tertiary institutions in Kebbi State will be assessed.

Awareness is the ability to perceive, to feel or the state of being conscious of something. Awareness is to have special interest in or experience of something and so being well informed of what is happening in that subject at the present time. Though many lecturers in higher institutions of learning may not be aware of the existence of cloud-based learning environment, however being aware of it is an important aspect for utilization and is needed for the benefits of CBLE to be fully actualized especially when positive attitude are developed.

Attitude is the disposition or state of the mind, it is a favorable or unfavorable evaluation of something. Attitudes are generally positive or negative views of a person, place, thing or event (Wong & Fong, 2014). The study on attitude towards blended learning and online learning environment indicated that students have positive attitudes towards online learning. Obaid (2017) also conducted a research on students' attitude to learning at tertiary level, it indicated that students have positive attitude towards online learning.

Perception is defined as an act of being aware of one's environment through physical sensation, which denotes an individual's ability to understand (Seels & Richey, 2017). Perception refers to the degree to which a person believes that a specific technology will affect his or her performances. A user of a technology system who perceives the system

to be very useful will experience a positive use performance relationship. Fernandes & Awamleh (2006) explained that perception is the degree to which a potential user considers a service or application as offering advantages over previous ways of performing tasks.

The perception for the consideration of cloud base learning for improvement of pedagogical learning has a lot to do with the thought and time for which the process has to be accepted. The perception of the lecturers is one of the key factors to this study, therefore, it is important to understand that the perception of lecturers which can shape their actions towards use of cloud base study.

Gender is a category such as "male" or "female" into which sexually reproducing organisms are divided on the basis of their reproductive role in their species, the identification of a man or woman or something else, and association with a social role or set of behavioral and cultural traits. (Egbo *et al.,* 2011) conducted a research on gender perception and attitude towards e-learning: A case of business students of the university of Nigeria, the study indicated that female gender would accept the use of ICT more than their male gender.

1.2 Statement of the Research Problem

In spite of the advantages to be derived from Cloud based computing learning system, such as helping lecturers use computer-based resources to enhance students' education, support collaborative learning, virtual laboratories, virtual libraries, ease of online information storage, communication and equal access to educational opportunities anywhere and anytime among others.

There exist challenges on the use of cloud-based computing learning system, in many tertiary institutions in the form of cost of purchase, bandwidth, data and information security, broadband internet, interoperability/compatibility, legislation, maintenance and

upgrading the various cloud base software and hardware system among others (Obodoeze *et al.,* 2014).

It is on this basis that the study sought to determine lecturers' awareness, attitude and perception towards the utilization of cloud base learning environment in tertiary institutions in Kebbi State.

1.3 Aim and Objectives of the Study

The aim of this study is to determine lecturers' awareness, attitude and perception towards the utilization of cloud-based teaching environment in tertiary institutions in Kebbi State. Specifically, the objective of the study is to:

1. Determine Lecturers' awareness on the utilization of cloud base teaching environment in tertiary institutions based on years of experience in Kebbi State.
2. Find out gender influence on lecturers' awareness on the utilization of cloud base teaching in Kebbi State.
3. Identify Lecturers' attitudes towards the utilization of cloud base teaching environment to deliver instruction based on years of experience in Kebbi State.
4. Determine the influence of gender attitude towards the utilization of cloud-based teaching in Kebbi State.
5. Determine Lecturers' perception towards the utilization of cloud base teaching environment in Kebbi State.
6. Find out the influence of gender perception towards the utilization of cloud base teaching environment in Kebbi State.

1.4 Research Questions

The following research questions guided the study.

1. To what extent are Lecturers of tertiary institutions aware of cloud-based teaching environment based on their years of experience?
2. Does gender influence lecturers' awareness of cloud-based teaching environment in Kebbi State?
3. What are the attitudes of Lecturers towards utilization of cloud-based teaching environment based on their years of experience?
4. Does gender influence lecturers' attitude towards the utilization of cloud-based teaching environment in Kebbi State?
5. What are the Lecturers' perception towards the utilization of cloud-based teaching environment based on their years of experience in Kebbi State?
6. How does gender influence the perception of the lecturers toward the use of cloud-based teaching environment in Kebbi State?

1.5 Research Hypotheses

The following null hypotheses were formulated at 0.05 level of significance to guide this study:

HO_1: There is no significant difference in the level of awareness of lecturers' on the existence of Cloud Base Learning for teaching based on their years of experience.

HO_2: There is no significant difference between male and female lecturers' awareness on the existence of Cloud-Based Teaching Environment.

HO_3: There is no significant difference in lecturers' attitude on Cloud-Base Teaching Environment based on their years of experience.

HO_4: There is no significant difference between male and female lecturers' attitude towards the use of Cloud-Base Teaching Environment.

HO_5: There is no significant difference in lecturers' perception towards the utilization of Cloud-Base Teaching Environment based on their years of experience.

HO_6: There is no significant difference between male and female lecturers' perception towards the utilization of Cloud Base Teaching Environment.

1.6 Significance of the Study

It is expected that the finding of this research would be of an immense benefit to lecturers, students, tertiary institutions authorities, among others.

Lecturers will benefit from this research, because it would help them to appreciate the use of cloud computing in the delivery of their learning process. The findings of this study are also expected to arouse the interest of tertiary institutions lecturers towards utilization of cloud-based learning environment (CBLE). It could serve as an eye opener to lecturers to realize how valuable technology as a medium of improving the quality of education. More so, it could act as a catalyst to encourage lecturers to go out of their comfort zone to be computer savvy and be fully prepared for the challenges of technology awaiting them in the future.

Students on the other hand will benefit from cloud computing technology to save cost in the purchase of educational materials, software, and hardware. Students need not carry all these materials everywhere, with no worry of losing data due to loss of device, breaking of compact disk. They can enjoy easy access and have the ability to share academic information anytime and anywhere.

Furthermore, the institutions will enjoy a reduce cost of IT infrastructure while enhancing accessibility and opportunities for establishing transparent and effective collaborations among other tertiary institutions in developed world. Cloud base technology in education has offered tertiary institutions potentials in changing how education as an industry works, it provides the perspective for institutions to offer online program which can be access anywhere and anytime in the world.

1.7 Scope of the Study

This study focused on lecturers' awareness, attitude and perception towards the utilization of cloud base learning environment in Kebbi State, Nigeria. The lecturers sampled for this study are limited to those who are currently teaching in the higher education institutions in Kebbi State. Variables are limited to awareness, attitude and perception of utilization of cloud base learning environment among lecturers. These variables are "dependent" to an "independent" variable which is the cloud base learning environment. The moderating variable for the research is gender. The instrument that was be used for data collection is questionnaire which comprises of four sections. The questionnaire will be administered within six weeks in the selected institutions.

1.8 Operational Definition of Terms

Awareness: The ability for lecturers to know, to feel or to be cognizant of cloud-based learning environment in tertiary institutions.

Attitude: The disposition or state of the mind of lecturers in the awareness, and perception of cloud-based learning environment in tertiary institutions.

Perception: The ability to see, hear, become aware or understand the true nature of educational material. It is the way lecturers grasp the awareness of cloud-based learning environment in the tertiary institution.

Cloud Computing: Cloud computing refers to an e-learning which is an internet-based learning process, using internet technology to design, implement, select, manage, support and extend learning which can be accessible anywhere, anytime and on any computing devices.

ICT: Information and Communication Technology (ICT) in education is the mode of education that use information and communications technology to support, enhance, and optimize the delivery of information.

Utilization: Utilization is the degree to which cloud-based learning environment is used by lecturers to achieve their desired expectation.

Education: It is the process of receiving or giving systematic instruction, especially at a school or university

1.8.1 Acronyms

IAAS: Infrastructure as a Service (IaaS) is one of the three fundamental service models of cloud computing alongside Platform as a Service (PaaS) and Software as a Service (SaaS).

SAAS: Software as a Service (SaaS) is a software distribution model in which applications are hosted by a vendor or service provider and made available to customers over a network, typically the Internet.

PAAS: Platform as a service (PaaS) is a category of cloud computing services that provides a platform allowing customers to develop, run, and manage web applications without the complexity of building and maintaining the infrastructure typically associated with developing and launching an app.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Conceptual Framework

The conceptual framework for this study is based on the interrelationship that exist between the variables. This research work focused on lecturers' awareness, attitude and perception towards the utilization of cloud base learning in tertiary institutions in Kebbi State. The moderating variable for the study is gender, lecturers in tertiary institutions of the state.

Below is a diagram showing the relationship between the various variables in the study.

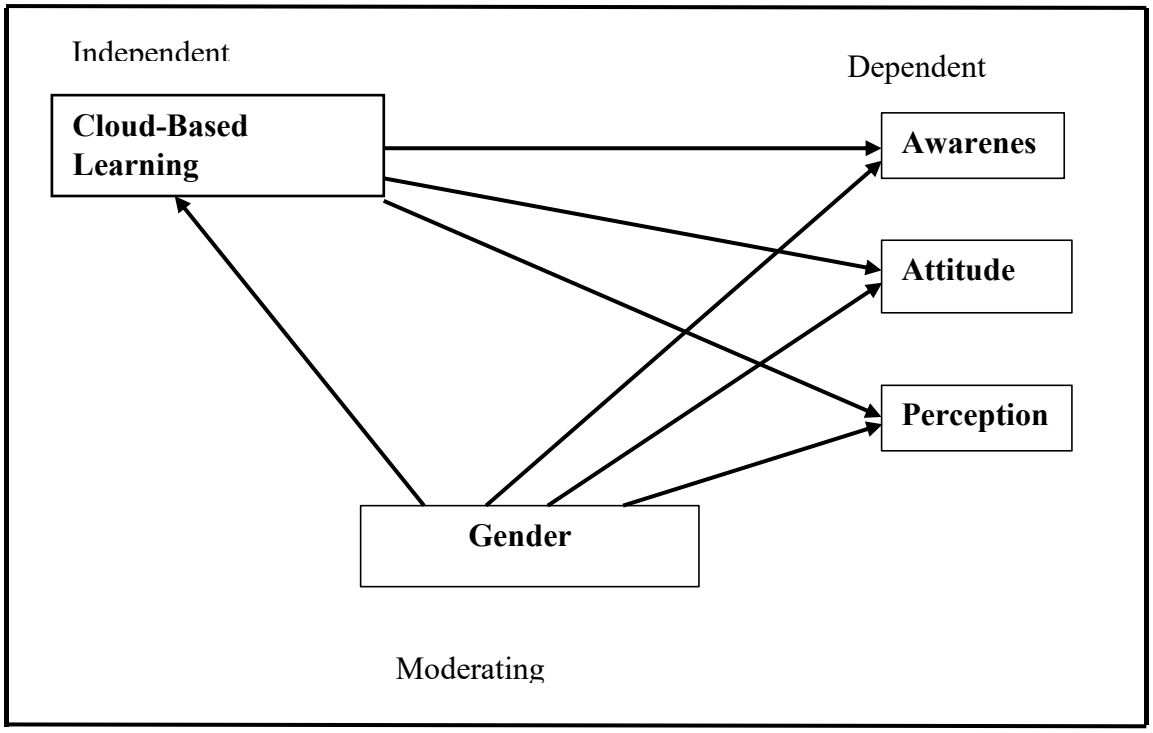

Figure 2.1. Conceptual Framework of Variables in the Study (Kuta and Mayowa, 2019)

2.1.1 Concept of e-learning

"E-learning means delivery of a learning, training or education program using computer or electronic device" (Stockley, 2003). Moreover, it is the process of knowledge building and knowledge confirming through asynchronous (which can be done even if the student is offline) and synchronous (student has to be online) electronic communication. The two applications of e-learning are fully online learning, which is a form of distance education and blended learning, which is most common in traditional higher education institutes (Kanaganayagam *et al.,* 2013.)

E-learning is based on the concept that different technologies could be used in order to improve the learning process; the use of such technologies may vary depending on the needs of the population and availability of resources i.e. budget and expertise. Hence, e-learning can be counted for the most recent method to carry out distance education by distributing learning material and processes over the Internet. Its "any time, any place" nature could be part of a winning strategy for particular needs, such as decongestion of overcrowded education facilities, support for students or teachers who live far away from schools and universities and adult education (Kihara & Gichoya , 2014).

The most important parts of e-learning include "Learning Management System (LMS)", "Learning Content Management System (LCMS)", "Production and content development tools and Authoring Tool", "E-learning delivery systems" and "Assessment and evaluation." (Lohmosavi *et al.,* 2013). Each of these subjects covers a vast area of concepts and subjects to be addressed. As an example production of content covers contracts with the professors (authors), assistant professors, digital content developers, infrastructure provider, and addressing other subject areas.

In recent years, e-learning has become an increasingly important method in education. Under the prevailing paradigm created by rapid pace of developing new technologies

and their impacts on creation of new sciences, the need to learn new concepts is rapidly increasing. “Over the last two decades, many higher education institutions have adopted a wide range of e-Learning tools into their educational delivery and support processes” (Boezerooij, 2006). E-learning became an important instrument in the new Higher Educational Environment in the digital age and, changes the paradigm of learning as well. It creates student-centered learning and educational practice, offering new and more flexible learning methods which are much more suitable for higher educations. The structure of today’s tertiary institutions must be ‘changeable’ in order to integrate distance learning courses, and those institutions that will not or cannot change their structure to incorporate this technology that may be bypassed by other educational providers, such as virtual higher institutions and independent educational services (Singh *et al.,* 2005). Rashty in his research mentioned that “the very use of technology for learning in higher education institutions have a positive effect on the student’s commitment to the learning process.

Like any other new paradigms, e-learning is facing some resistance from traditional paradigms. Old school of thoughts in educations and legacies in many faculties of different educational institutes tend to question the effectiveness and appropriateness of e-learning. Creating doubts on the validity of assessment methods, lack of live interaction and trust issues are amongst the critics raised by old school of educating against e-learning. Therefore, it is crucial to find simple and effective solutions to contain these critics, provide concrete evidences for the validity of evaluation method, and gain the trust of all users of e-learning systems (Tan *et al.,* 2014). Therefore, cloud-based e-learning system was introduced and adapt to e-learning platform.

2.1.2 Cloud computing

Researchers have a different definition about cloud computing. “Some researchers believe that cloud computing is an evolution of various computing resources and technologies at different times, combined to deliver new possibilities through high-speed internet works” (Ewuzie & Usoro, 2012). Other researchers like Lohmosavi, Nejad & Hosseini believe that “cloud computing refers to internet software as service, hardware, servers in data center which runs software computer services needs high reliability, scalability and autonomy to support accessibility everywhere” (Lohmosavi *et al.,* 2013).

Deploying cloud computing can differ depending on requirements, and following four deployment models have been identified each with specific characters that support the needs of the services and users of the clouds in particular four ways;

Public: which allows systems and services to be easily accessible to general public, e.g., Google, Amazon; Microsoft offers cloud services via Internet (Tutorialspoint.com ,2015).

Private: which the cloud infrastructure has been deployed, and is maintained and operated for a specific organization. The operation may be in-house (dialogic, 2010).

Community: The Community Cloud allows system and services to be accessible by group of organizations. It shares the infrastructure between several organizations from a specific community. It may be managed internally or by the third-party (Tutorialspoint.com, 2015).

Hybrid: The Hybrid Cloud is a mixture of public and private cloud. Non-critical activities are performed using public cloud while the critical activities are performed using private cloud (Tutorialspoint.com, 2015). Educational institution according to

their budgeting and academic needs, privacy and security issues will choose any of these approaches.

2.1.3 Cloud services

As it has been mentioned in (He & Yue, 2012) "cloud computing provides different services rather than a unit of product. These services put forwarded 3 models: software as a service (SAAS), platform as a Service (PAAS), and infrastructure as a Service (IAAS)."

SAAS (Software as a service): is software delivery method that provides access to software and its functions remotely as a Web-based service (Reese, 2009).

This model is model gives the biggest advantages for the universities which have to implement and maintenance big computer laboratories. By using this model laboratories has high adoption and availability to any computer, any place, anytime. Also, the maintenance and upgrades are easy and central. This will improve student and teacher's motivation and access e-learning materials and communication.

PAAS (Platform as a Service): is a platform that allows developers to build applications and services over the internet. PAAS services are hosted in the cloud and accessed by users simply via their web browser. Users can develop applications based on internet, for server space, data security and creative programming environment in order to share it to other users (Shirzad *et al.,* 2012). For many students and instructors, it is impossible to be able to pay for such systems personally, however educational institution can help their teaching and learning process by giving PAAS services to their students.

IAAS (Infrastructure as a Service): IaaS is defined as computer infrastructure, such as virtualization, being delivered as a service (Shirzad *et al.,* 2012). Universities which are

more critical about their privacy and security can use this model which able them to use shared pool of virtual, fully configured server, storage and network resources hosted in global network of data centers.

Platform as a Service (PaaS), and Software as a Service (SaaS) (Lakshminarayanan *et al.,* 2013).

2.1.3.1 Cloud services available for education

Leading cloud providers have recognized the importance of adjusting their computing services specifically to the needs of educational institutions. These include customized software packages at low prices that more institutions can afford. Some of the most widely used educational platforms are: Microsoft for Education: Microsoft is one of the companies whose services have been reforming education for more than two decades. The Microsoft cloud is currently available to the educational institutions in the following forms: Office 365 for Education (formerly Microsoft live@edu), Business Productivity Online Suite (BPOS), Exchange Hosted Services, Microsoft Dynamics CRM Online and Office Web Apps. Google Apps for Education: Google Apps for Education is a widely used platform for outsourcing free web-based email, calendar and documents for collaborative study. Google has initiated two important campaigns for introducing improvements in the education sector. Chromebooks for Education is one of the most important Google projects aimed at education innovation. Another important Google initiative is Tabletswith Google Play for Education, which enable educators to smoothly implement the latest technology solutions into classrooms and make useful apps available to their students.

Amazon Web Services (AWS) in Education: Is an education-friendly set of services that provides cost-efficient solutions to universities, community colleges, vocational schools and districts. AWS users have at their disposal computing and storage resources that

contribute to a creation of flexible IT infrastructure in these institutions. Salesforce.com Education Cloud Platform: The Salesforce.com platform provides all the tools needed for the educational institutions to instant scalability, ease of configuration and support for multiple functional roles. It enables comprehensive oversight of operations and applications allowing students, researchers and faculty to track, analyze and refine every aspect of their efforts. The Salesforce.com platform can also assist educators manage their services more efficiently from application to graduation while tracking individual details such as study abroad term, participation in campus organizations, study groups and other operations (Salesforce.com).

International Business Machine (IBM) Cloud Academy: The benefit of IBM Cloud Academy form access to a broad portfolio of IBM Cloud Computing projects, offerings and services that are designed for education and learning. Their researchers can innovate on the next generation of Cloud Computing technologies. They can collaborate with peer member institutions, as well as with the IBM research and development community, to create new approaches and strategies to improve educational services through Cloud Computing. The higher educational institutions pursue Cloud Computing initiatives, develop skills and share best practices for reducing operating costs while improving quality and access to education. According to IBM, Cloud Computing makes it easier for those in the education environment such as students, faculty and administrators, to gain immediate access to a wide range of new educational resources and research software and tools.

2.1.4 Cloud computing technology in education

Cloud computing is one of the latest innovations which have a visible effect on the education environment. Today's educational industry equips learning environment with new technologies and skills. Hence, the role of tertiary institutions is to change the

direction of the learning environment from the traditional classroom-based method into Cloud-Based Learning (Chunwijitra, 2013). The concept of "Cloud Computing" has brought along a change in this paradigm. It has relieved the educational institutes of burdens related to buying storage and server facilities, recruiting experts to handle them and a department and space to be allocated for the purpose. As a result of that, recently, most e-learning systems are designed on cloud base environment which is able to run on a wide range of hardware devices, while storing data inside the cloud (Masud & Huang, 2012).

2.1.5 Cloud computing technology in higher education

"In e-learning, most of the lecturers and students spend their time on the internet through virtual communication. Content delivered through the Internet emerged through dynamic communication by sharing them in the 'cloud'. It is important to have a place to store all information stated through their sharing session" (Hamidon, 2014). It seems that cloud computing can play its roles. Cloud computing offers an interoperable way of providing and sharing services such as computing and data storage over the Internet (Kang, 2011).

Cloud computing in education is seen as the next wave of information technology. Cloud-based education has become the impetus of innovating teaching model, learning style and learning environment. There are many cloud-based applications, like Google Docs, SkyDrive, Evernote, and other educational applications that make it possible for everyone to learn whatever and whenever they want (Wu & Peng, 2014). Such public cloud-based applications will deliver benefits to the educational institution. Its advantages may be even more pronounced in small colleges that have not yet achieved high levels of computerization, or have trouble recruiting people with adequate IT skills, or those worried about their ability to secure and protect data (Cisco, 2009).

Different renowned universities have established consortium for their e-learning platforms and content developments, since these universities are sharing their resources to minimize the costs, cloud computing can be of use for these consortiums as well, because it can reduce the cost of dissemination and storage for all. Students and university staff use many of technologies in their personal life, so using cloud computing services such as applications based on cloud can improve their communicating while saving time. Teachers can prepare and upload and manage their teaching materials, (e.g. presentations, articles, documents, courses etc) into the cloud using the latest technologies. Also, computer technicians can provide, build and test cloud based applications directly on the cloud infrastructure and the servers. They will benefit from services 24/24, from everywhere at low costs (Ghazizadeh, 2012). As it can be seen in Figure 2, cloud computing will provides all kind of users to have access to documents, applications, information.

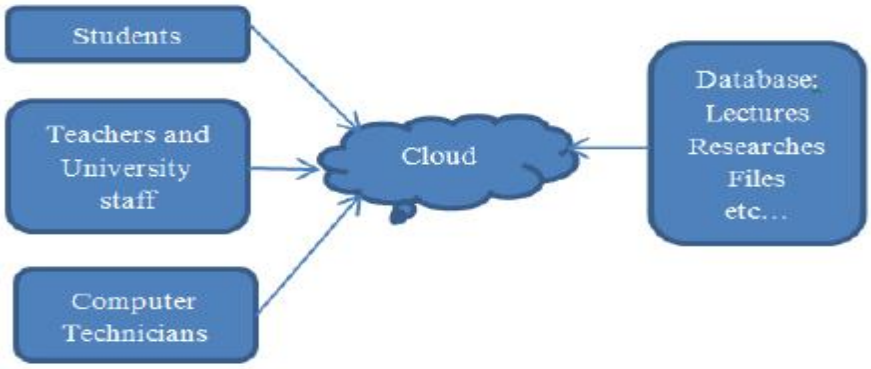

Figure 2: Structure of the main users of cloud computing in an educational environment (Ghazizadeh, 2012)

Higher education institutions are progressively turning to cloud computing for decreasing the cost and taking advantage of latest technology, in term of having positive effect on students learning process. “Using the cloud greatly rises IT agility and allows institutions to pay for only the IT services they use, enabling better resource tracking, more foreseeable costs, improved budget estimating, and faster return on

investment"(Jenhani, 2007). This can also help universities to focus their investment, budgeting on improving educational procedures and management.

2.1.6 Cloud-Based learning system

As it mentioned by Méndez & González, e-learning is an Internet-based learning process, using Internet technology to design, implement, select, manage, support and extend learning, which will not replace traditional education methods, but will greatly improve the efficiency of education (Méndez & González, 2011).

On the other hand, e-learning cloud is a migration of cloud computing technology in the field of e-learning, which is a future e-learning infrastructure, including all the necessary hardware and software computing resources engaging in e-learning. After these computing resources are virtualized, they can be afforded in the form of services for educational institutions, students and businesses to rent computing resources (Huanying, 2010) and (Masud *et al.,* 2012).

Cloud computing can promote a new era of learning taking the advantage of hosting the e-learning applications on a cloud and following its virtualization features of the hardware, which reduces the construction and maintenance cost of the learning resources, Moreover the availability of teaching materials, accessibility of needed software and constant connection of students and instructors are the most important educational approach of this technology (Fernandez *et al.,* 2012). At the present, the combination of cloud technologies and e-learning has been scarcely explored. Some relevant efforts to use IaaS cloud technologies in education focuses on the reservation of Virtual Machines to students for a specific time frame (Vouk *et al*., 2008).

As it mentioned by Madhumathi and Ganapathy, (2013) Nasr & Ouf, (2011), potential values of e-learning in cloud computing are as follows:

i. Provide opportunity for ubiquitous computing

ii. No need for backing up everything to a thumb drive and transferring it from one device to another.

iii. No need to copy all stuff from one PC to another when buying a new one. It also means students can create a repository of information that stays with them and keeps growing as long as the students/faculty wants them.

iv. Crash recovery is nearly unneeded. If the client computer crashes, there are almost no data lost because everything is stored in the cloud.

v. Allows students to work from multiple places (home, work, library, etc), find their files and edit them through the cloud and browser-based applications can also be accessed through various devices (mobile, laptop and desktop computers, provided internet access is available) and thus transforms e-learning to m-learning.

vi. Most software is free, available and ready-to-use.

vii. Lecturers and students can have a richer and more diverse teaching and learning experience, even outside class hours.

viii. Allows lecturers and students to create content through the browser, instead of only searching through the browser.

ix. It provides a low cost solution to academic institutions for their researchers, faculty and students.

x. It provides flexible infrastructure to maximize investments. Cloud computing allows user to dynamically scale as demands fluctuate.

xi. It helps to make data and services publicly available without jeopardizing sensitive information.

It is almost impossible for any interested malicious lecturer to determine where the location of the machine that stores some wanted data (tests, exam questions, results) or to find out which is the physical component student needs to steal in order to get a digital asset.

2.1.6.1 Benefit of cloud base learning environment

The cloud has disrupted the education scenario for good – freeing it from the confines of space and time. It also brought a major shift in the focus of instruction. Student interests are taking center stage, and the methodical teacher-centered learning is being replaced by learner-centered instruction.

The cloud technology dramatically reduces the time, funds and infrastructure educational institutions require to reach to the new markets. Not only do institutions benefit from the economies of scale, but they can also channelize the savings towards strategic learning initiatives and other revenue streams. Apart from these, institutions will achieve operational efficiency with the centralized control while the students become more engaged with the options available to them. Lecturers focus more on learner requirements rather than on mundane admin tasks.

Already, the cloud in education is a huge market worth $5 billion; it is expected to cross $12 billion in 2019, according to a report, Cloud Computing in Education Market – Worldwide Market Forecasts and Analysis (2014-2019). Another report from CDW – 2013 State of the Cloud showed that 48% of the higher institutions that participated in the survey saw moving to cloud as a top priority, which shows that the cloud finds its benefits in the education sector. The cloud has continued revolutionizing the delivery of education and has made it available to even the remote and the less-privileged strata of the society. According to a UNESCO Institute for Information Technologies in

Education report, the global demand for primary and higher education through the cloud would double by 2025.

2.1.7 Awareness of cloud base learning environment (CBLE)

Awareness is the ability to perceive, to feel or the state of being conscious of something. According to Cambridge international dictionary, awareness is to have special interest in or experience of something and so being well informed of what is happening in that subject at the present time. Thou many lecturers in the higher institutions of learning may be aware of the existence of Cloud Base Learning Environment, but what is their perception about the use of Cloud Base Learning Environment? The awareness of Cloud Base Learning Environment is an important aspect of utilization and is needed for the benefits of CBLE to be fully actualized. Awareness can be described as the state of being informed of something exists. There is need for awareness of the existence of cloud base learning environment. The emergence of Cloud Base Learning Environment may bring a change into how people teach, learn, access and use educational resources that is available for use. It can provide materials in diverse disciplines that match user's needs. The Cloud Base Learning Environment may provide the avenue for higher institutions to share its resources with the public, not to keep it to herself. For Cloud Base Learning Environment to be fully and correctly used, there is need for people especially lecturers to be aware of its existence and its importance in educational settings which relatively has impact on digital information in education (Jagannath *et al.,* 2013). When the reason for existence of material is not known, abuse is always inevitable, the CBLE initiative is basically developed to enhance the existed e-learning system in circulation all over the world and to provide universal education to all in order to reduce high cost for education resources.

Traditionally, distance education has experienced limitation in the number of people served due to the cost of production, reproduction, and distribution of materials in teaching and learning process but nowadays it only costs the higher institutions time and money to produce a course, technology has made it possible to reproduce learning materials at almost no cost. This shift allows distance educators to play a significant and important role in the fulfilment of the promise of the right to universal education. Higher institutions can make their content available to millions at little or no cost which has the potential to substantially improve the quality of teaching and learning process around the world. For this to be effective in Nigeria, lecturers in higher institutions need to be aware about the importance and usefulness of the CBLE, they must be ready to embrace the current trends of technology and relate with their colleagues all over the world so that they will be updated, share their own ideas and blend their teaching to suit the current curriculum in their area of specialization.

2.1.8 Attitude towards utilization of cloud base learning environment

The advent of (ICT) has no doubt revolutionized the way we communicate in the 21st century and how we socially interact. These field of Education has impacted the use of various technologies that are available online for various administrative academic processes. Its increasing usage in higher institutions for teaching and learning has led to an increase in knowledge over the years and is gradually becoming responsible for enormous changes in the pedagogies of teaching leading to a more interactive learning process (Agbetuyi & Oluwatayo 2012).

Technological integration requires the lecturers to understand the technologies available for use and which tools and skills that would be required to make learning easier for students. Attitude with reference to higher education is based on the competence in the

integration, acquisition, implementation of educational policies and usefulness of technologies to enhance both teaching and learning in institutions.

2.1.9 Perception and utilization of cloud base learning environment

Perception refers to the degree to which a person believes that a specific technology will affect his or her performances. A user of a technology system who perceives the system to be very useful will experience a positive use performance relationship. Fernandes & Awamleh (2006) explained that perception is the degree to which a potential user considers a service or application as offering advantages over previous ways of performing tasks. (Gong *et al.,* 2004) define perceived usefulness to be the user's subjective probability that the use of a specific application will increase their expectations.

2.2 Theoretical Framework

The theory/model that back this study is: Technological Pedagogical Content Knowledge.

2.2.1 Technological Pedagogical Content Knowledge (TPACK)

Teachers in the 21st century must not only be familiar with the operation of instructional technologies but also with their applications within the curriculum and their classroom (Eisenberg & Johnson, 1996). Topper (2004) suggests that "for lecturers to use technology to support their teaching, and see it as a pedagogically useful tool, they must be confident and competent with the technology they are planning to use". As the successful use of technology continues to gain attention and becomes more ubiquitous in our society novice and veteran teachers may possess the pedagogy but lack a technological base from which to adapt the device (Greenhow *et al.,* 2008). Many lecturers, particularly more veteran lecturers, would not have addressed technology integration in their initial teaching training and may or may not have attended

professional development courses on the topic or on specific technologies. Lecturer training concerning technology is critical. As part of this study participants will be asked survey questions pertaining to their technology training, both formal and informal. The results of these questions will help to identify the extent of technology training and years of teaching experience.

Having a variety of different technology tools at one's disposal is only half the picture, what one dose with them is the other. Innovation is a very complex topic when it is applied to the teaching and learning environment. Some consider a successful "innovation" to be a new approach that brings an improved result. The way a teacher combines existing technology tools to generate a new learning experience for the students is what will change traditional pedagogical practices. In describing what innovation may look like in the teaching and learning environment, it may be helpful to first depict what are thought of as more "traditional" practices. Traditional approaches to teaching are often characterized as involving "direct instruction:" teachers communicate content in a clear and structured way and demonstrate those concepts through explanations.

The framework that back this study is the TPACK framework. The Technological Pedagogical Content Knowledge (TPACK) framework (Koehler & Mishra, 2008) describes the type of teacher knowledge required to teach effectively with technology. Describing what lecturers need to know can be difficult because teaching is an inherently complex, multifaceted activity which occurs in varied settings. The use of technology in the classroom introduces a new set of variables into the teaching context, and adds complexity due to its rapidly-changing nature (Koehler & Mishra, 2008). The TPACK framework identifies a unifying structure that not only respects this complexity, but also provides guidance for appropriate

technology integration (Koehler *et al.,* 2006). The TPACK framework describes the kinds of knowledge and teachers must understand how technology, pedagogy, and content interrelate, and create a form of knowledge that goes beyond the three separate knowledge bases. Teaching with technology requires a flexible framework that explains how rapidly-changing, protean technologies may be effectively integrated with a range of pedagogical approaches and content areas that teachers need in order to teach with technology, and the complex ways in which these bodies of knowledge interact with one another.

In the TPACK framework, what teachers need to know is characterized by three broad knowledge bases –technology, pedagogy, and content – and the interactions between and among these knowledge bases. In this approach, technology in teaching is characterized as something well beyond isolated knowledge of specific hardware or software. Rather, technology that is introduced into teaching contexts "causes the representation of new concepts and requires developing a sensitivity to the dynamic, transactional relationship between all three components" (Koehler & Mishra, 2005). Good teaching with technology, therefore, cannot be achieved by simply adding a new piece of technology upon existing structures. Good teaching, with technology, requires a shift in existing pedagogical and content domains.

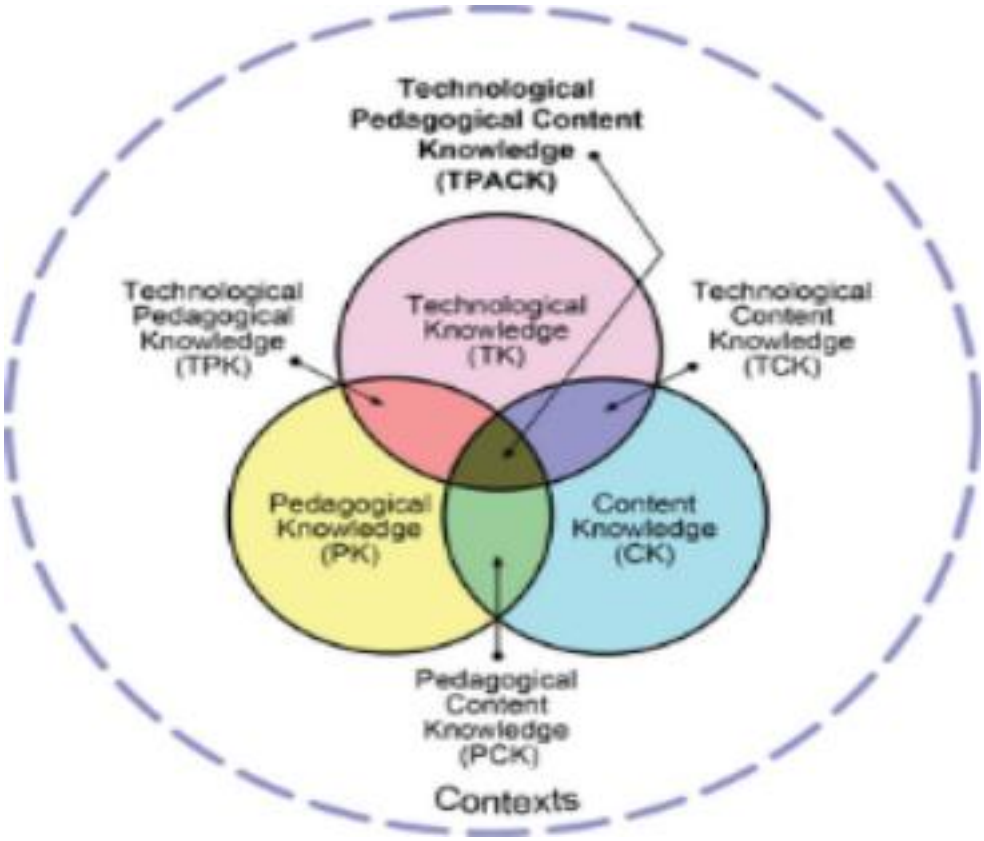

Figure 3. TPACK Framework (Image from http://tpack.org)

The TPACK framework also emphasizes the role of the context within teaching and learning occurs. Ignoring context leads to "generic solutions to the problem of teaching" (Mishra & Koehler, 2006,). Teaching is a context-bound activity, and teachers with developed. TPACK use technology to design learning experiences tailored for specific pedagogies, crafted for specific content, as instantiated in specific learning contexts. In the sections below we describe each of the components of the TPACK framework and, most importantly, their interactions with each other.

Technological Knowledge (TK)

TK includes an understanding of how to use computer software and hardware, presentation tools such as document presenters and projects, and other technologies used in educational contexts. Most importantly, TK covers the ability to adapt to and learn new technologies. It is important to note that TK exists in a state of flux, due to the rapid rate of change in technology (Mishra *et al.,* 2009) and due to the protean nature of technology (Koehler & Mishra, 2008). For instance, modern computer hardware and software become quickly obsolete, and computers can be used for a variety of pedagogical tasks, such as research, communication, and media consumption and creation.

Content Knowledge (CK)

CK refers to the knowledge or specific nature of a discipline or subject matter. CK varies greatly between different educational contexts (e.g. the differences between the content of primary school math and graduate school math), and teachers are expected to master the content they teach. Content knowledge is also important because it determines the discipline-specific modes of thinking unique to each field.

Pedagogical Knowledge (PK)

PK describes the "general purpose" knowledge unique to teaching. It is the set of skills that teachers must develop in order to manage and organize teaching and learning activities for intended learning outcomes. This knowledge involves, but is not limited to, an understanding of classroom management activities, the role of student motivation, lesson planning, and assessment of learning. PK may also describe knowledge of different teaching methods, such as knowing how to organize activities in a way conducive to students' constructive building of knowledge.

Pedagogical Content Knowledge (PCK)

PCK reflects Shulman's (1986) assertion that effective teaching requires more than separate understanding of content and pedagogy. PCK also acknowledges the fact that different content lends itself to different methods of teaching. For example, the teaching of speaking skills for a foreign language teacher requires student-centered activities where students engage in meaningful and authentic communicative tasks. Contrast this to a graduate-level art appreciation seminar where a teacher-centered lecture may be an appropriate way for the professor to describe and model ways of engaging with art. In this sense, PCK means going beyond being a content expert or just knowing general pedagogic guidelines, to understanding the unique interplay between content and pedagogy.

Technological Content Knowledge (TCK)

TCK describes knowledge of the reciprocal relationship between technology and content. Technology impacts what we know, and introduces new affordances as to how we can represent certain content in new ways that was not possible before. For example, today, students can learn about the relationship between geometric shapes and angles by touching and playing with these concepts on the screens of handheld, portable devices. Similarly, visual programming software now allows even primary school students to pick up programming by designing and creating digital games. In addition, technology enables the discovery of new content and representations of content; such as the relationship between the advent of Carbon-14 dating for archeology and the manner in which Google Trends can be used to predict the spread of the flu virus (Qualman, 2013).

Technological Pedagogical Knowledge (TPK)

TPK identifies the reciprocal relationship between technology and pedagogy. This knowledge makes it possible to understand what technology can do for certain pedagogic goals, and for teachers to select the most appropriate tool based on its appropriateness for the specific pedagogical approach. Technology can also afford new methods and venues for teaching, and ease the way certain classroom activities are implemented. For example, collaborative writing can take place with Google Docs or Google Hangouts instead of face-to-face meetings, extending collaborative activities over distances. Also, the advent of online learning and more recently, massively open online courses (MOOCs) require lecturers to develop new pedagogical approaches that are appropriate for the tools at hand.

Technological Pedagogical Content Knowledge (TPACK)

TPACK describes the synthesized knowledge of each of the bodies of knowledge described above, with a focus upon how technology can be uniquely crafted to meet pedagogical needs to teach certain content in specific contexts. Alone, each of the constituent bodies of knowledge, that comprise TPACK, represents a necessary and important aspect of teaching. But effective teaching is much more than each of the pieces (TK, PK and CK). For the teacher with TPACK, knowledge of technology, pedagogy, and content is synthesized and put to use for the design of learning experiences for students. The TPACK framework is a testament to the complexity of teaching. The framework proposes that tackling all of the variables at once creates effective teaching with technology.

2.2.2 TPACK technology integration

Technology integration in the teaching and learning environment is continuing to evolve and becoming more important as education moves further into the twenty-first century.

The ways in which teachers accomplish this integration are as diverse as the types of learning styles that students exhibit in any classroom. Digital devices and supporting equipment, such as computes, tablets, smartphones etc. can afford opportunities to enhance the learning experience and convey concepts and ideas that would otherwise be difficult to express. Defining what technology integration is, and what it is not, should be the first step in deciding how to incorporate it into the classroom (Dockstader, 1999), and a clear definition of technology integration supports analysis in this study.

The concept of technology integration is complicated and researchers have assumed multiple perspectives on this subject. In the past 30 years, the definition of technology integration has developed and been refined by various authors and researchers. The "uses" presented by Thayer (2011) are a thoughtful lens for examining this development and will help to support this researcher to develop a definition of technology integration for this study. According to his blog Education4site, Thayer (2011) describes three uses of technology integration and argues that without considering each of the three one might miss the holistic intent and thus will have a limited picture and understanding of technology integration. The three "distinctly different aspects" are: Technology Integration in Learning (TiL), Technology Integration in the Classroom (TiC), and Technology Integration in Instructors' duties (TiI). Each of these aspects can be considered as a piece of technology integration as a whole in a teaching and learning environment. However, for the purposes of this study, these different perspectives, collectively, will be considered as technology integration. To some teachers, technology integration might mean utilization of the most-recently developed technologies such as: tablets and wearable devices; implementing a one-to-one laptop initiative, where each student is provided with a laptop; development of daily lessons integrating an interactive whiteboard; or even the launch of online instructional programs that may

substitute for the traditional textbook. To other teachers it may mean creating a PowerPoint to demonstrate an understanding of a concept, or it may mean taking the students to the computer lab once a week to work on a research project. Still other teachers may view technology integration as the use of the overhead, chalkboard or dry erase board, or textbooks with paper and pencil.

Technology can provide students with the opportunity to demonstrate creative ideas in an innovative format that is otherwise unobtainable in the standard classroom setting (Okojie, *et al.,* 2006). Not only must the technology be used, but choices about how to integrate it into the learning environment must be deliberate and support students by, for example, enhancing a student's understanding and perception of the concept being presented, or enabling the student to express his or her understanding of the concept in a novel way. Teachers might also find the use of technology appealing because it provides access to a range of alternative instruction options that exposes them to both how and what students understand. Technology integration is not limited to the physical pieces of equipment in the classroom but must include a knowledge base from which to use it productively. (Okojie, *et al.,* 2006) conducted a study on the perceptions of technology integration and how issues of computer shortage, lack of computer skill, and technology intimidation could hinder the integration of technology in a teaching and learning environment. The researchers studied how technology integration is narrowly perceived and they focused on that perception to help establish an understanding of the scope of technology integration in education. (Okojie *et al*., 2006) also considered the development of learning objectives based on technology use, the selection of instructional methods to further technology integration, the solicitation of feedback from teachers, and the evaluation of assessment strategies for follow up activities. The researchers established the argument that technology needs to be used for teaching and

learning and should be considered as an integral part of instruction, not as an object exclusive to itself. By considering the how and the why of technology integration as Earle (2002) did, educators can discern connections between the two, and draw technology closer to instruction. According to Okojie *et al.* (2006), "Technology integration not only involves the inclusion of technical artifacts per se, but also includes theories about technology integration and the application of research findings to promote teaching and learning". Teachers must possess some pedagogical intent to enhance the learning experience through the use of a technological device. (Okojie, *et al.,* 2006) go on to describe this needed intent as: Strategies for selecting the desired technologies, skill to demonstrate how the selected technologies will be used, skill to evaluate such technologies, as well as the skill to customize the use of such technological skills in a way that addresses instructional problems.

According to Cuban *et al.,* (2001), students' use of only applications, such as the Internet to conduct a simple search or Google to obtain images, represents a low degree of technological integration. In contrast, the development of multi-media presentations containing animation, video editing and completing projects that involve collecting and explaining data, represents a high degree of integration. Teachers who are exploring questions such as "How can one take what they already have and enhance it through the use of technology?" exhibit the type of thinking that might elevate technology integration to the next level (Cuban *et al.,* 2001).

While technology integration, as a phrase, is used often in educational settings, it is not clear that everyone means the same thing when they use that phrase, as seen in the above examples. Existing definitions of technology integration are explored in this section and combined to form an accepted understanding for the underpinnings of this research. According to Condie (2009), who considers the integration of technology from

a business perspective, "the lack of a precise definition of technology integration has caused the term to be inappropriately associated with the most basic and limited data meshing procedures" (Condie, 2009). This concept has also been found to be true in a great number of teaching and learning environments.

True integration, Condie argues, enables the user to have a complete set of information in one system that is retrievable at the touch of a button. With a system such as this, information can be passed effortlessly between related applications to ensure that accurate and complete information is used throughout the information exchange process (Condie, 2009).

Strong technology integration may be dependent upon both the teacher's perception of its effective use, and the perceived understanding of what the students may obtain from the utilization of technology. According to Earle (2002), "Technology involves the tools with which we deliver content and implement practices in better ways. Its focus must be on curriculum and learning. Integration is defined not by the amount or type of technology used, but by how and why it is used". This idea of intended use was also emphasized by Okojie, *et al.* (2006) who state, "it should be noted that technology, which is used to facilitate learning, is part of the instructional process and not an appendage to be attached at any convenient stage during the course of instruction.

The integration of technology goes beyond the utilization of a digital device, but rather is a part of the instructional process and must be deliberate in how and why it is being used. For the purpose of this study, a digital device will be defined as an electronic device such as a laptop, tablet or smart phone. Simply placing these digital devices in the classroom or establishing a computer lab is only providing increased access for students. Technology integration must also consider electrical infrastructure and network capabilities to ensure adequate operation as well as teacher education to

support effective classroom and pedagogical use. It is insufficient to provide students and teachers with the digital device without the support to explore what can be done with these technologies and how their use can enhance the learning process.

In 2008, the National Center for Educational Statistics (NCES) described technology integration in this way: "Effective integration of technology is achieved when students are able to select technology tools to help them obtain information in a timely manner, analyze and synthesize the information, and present it professionally. It continues to state that "the technology should become an integral part of how the classroom functions; as accessible as all other classroom tools" (NCES, 2008). This more refined definition now considers not only the perceptions of the teacher, but also includes the role of the student in accessing and using technology. Mishra & Koehler (2009) would concur by stating, "Technology integration approaches that do not reflect disciplinary knowledge differences, the corresponding processes for developing such knowledge, and the critical role of context ultimately are of limited utility and significance, as they ignore the full complexity of the dynamic realities of teaching effectively with technology". The authors continue, explaining that the concept of integrating technologies into the teaching and learning environment can be seen through a variety of different lenses, and only through exploring each can one obtain a sense of what true technology integration should look like.

The teacher must consider the pedagogical potential of technology to enhance the lesson, as well as student understanding in obtaining the desired learning outcomes. To begin defining integration, an acknowledgment should be made that an agreed upon a definition has yet to emerge (Dockstader, 1999, Condie, 2009). The variations identified in defining integration seem to be dependent upon one's perspective of use. As noted earlier, (Thayer, 2011) considered three different aspects of integration, TiL

(Technology Integration in Learning), TiC (Technology Integration in the Classroom), and TiI (Technology Integration in Instructors' duties). These device classifications begin to shape how one might perceive use from this intended use. Cuban *et al.* (2001) considered different degrees of integration ranging from a simple Google search to a collaborative multi-media presentation. Researchers have identified how the integration of technology goes well beyond the act of placing digital devices in the classroom, establishing a computer lab, or providing increased access for students (CAEP, 2011, NCES, 2002). Integration of technology must also consider how and why it is used (Okojie *et al*., 2006) and consequently establishes a pedagogical basis of intent. For the purpose of this study, the following will be considered as the definition of technology integration: True technology integration is only achieved when students are able to select technology tools that will help them obtain information, analyze it and synthesize that information for future use (NCES, 2008).

It is the hope of researchers to further explore the ways a teacher chooses which technologies to use, and for what purpose, so that individuals' definitions of integration may be further explored within one school. To inform this study, an examination of the research on the following questions was undertaken: What are the factors that influence particular technology choices for teachers? Do teachers define the affordances of particular devices and technology platforms similarly? Do those definitions vary by discipline? The choices that teachers make to incorporate technology into their teaching and learning environment seem to stem, at least in part, from their own personal knowledge base of what technology is available, what it can do, and how it can be used to enhance the learning experience through innovative practices. A better understanding of this process could inform how we think about supporting the development of

technological integration for teachers and perhaps contribute to an expanding definition of what it truly means to integrate technology.

Innovation on the other hand, is what a teacher does with the integration of technology.

This view point focuses on what is being done with what is available to teachers. Providing teachers with the latest technology may not provide the students with a meaningful learning experience if the teacher is not utilizing the technology in meaningful and engaging ways. In a study by Kwek (2011), the researcher looked at how design thinking (innovation) was used in the teaching and learning environment as a new model of learning. Kwek utilized observations and interviews to develop a fuller understanding of teacher's motivations that drive one's ability to adopt innovative approaches to instruction. "Schools whose curriculum and pedagogy fail to engage our younger generation as active learners and meaning creators are thus not doing justice to a nation's development, especially when knowledge has become power in a globalized world". If teachers are not utilizing the technology available to them in meaningful ways their students are missing out on the chance to express their creativity and a chance to be innovative. Kwek found that teachers must have a mastery of their academic core content that then drive how design thinking is used in the teaching and learning environment. "The basic instructional approach of talking to students as they sit passively in their seats remains to be the most common teaching style. "Design Thinking is an approach to learning that focuses on developing children's creative confidence through hands-on projects that focus on empathy, encouraging ideation and fostering active problem-solving skills. As a teacher begins to utilize design thinking they can provide experiences for students that encourage meaning without the imposition of a fixed set of knowledge and skills.

Even though times have changed, schools have kept the logic of preparing factory workers as the basis of their existence. In a study by L. Donovan, T. D. Green and C. Mason (2014) they developed an innovation configuration map based on the Concerns-Based Adaption Model of Change. The results of this study indicate that 21st century skills can be manifested in the teaching and learning environment through content-based and project-based approaches. Donovan *et al.* states that "Without a consistent operational definition of 21st century skills (such as innovation) it is difficult to determine whether true 21st century teaching and learning is occurring. They go on to state that, "The perspective that we must first have is an understanding of implementation before we can begin to determine effectiveness, it is apparent that there is a need to clearly document what a 21st century teaching and learning environment is before we can develop an effective assessment of its impact.

Kuboni *et al.* (2016) define innovation as "the process of making changes to something established by introducing something new." It applies to "…radical or incremental changes to products, processes or services". For the purpose of this study, innovation will be defined as the application of existing technologies to introduce, produce and develop new ideas and concepts through content-based or project-based approaches.

2.2.3 Barriers to teachers technology integration

The struggle to define technology integration is impacted by individual perceptions of what technology is, and these perceptions, in turn, may influence the way these individuals experience barriers to integration in their classrooms. Known barriers include: "improper operation of computers, maintenance problems associated with outdated software at home or work and inadequate technical support at work" (Javeri & Chen, 2006); time to learn the operation of a technology (Butler & Sellbom, 2002); and technology support and access (Fletcher, 2006). Experiences with these

operational barriers can impact willingness to engage with existing and future technologies in the classroom.

As educators begin to integrate technology into their courses, they are likely to encounter barriers that might deter them from pursuing any further integration attempts. Greenhow *et al.* (2008) state that, "Skillful teaching is demanding, and integrating technology into teaching and learning places additional demands on teachers. Ertmer (1999), discusses two types of barriers that teachers face when confronted with these types of added demands. She identifies "first-order barriers" as being "extrinsic to educators and may include such problems as a lack of access to program software and desktop access, insufficient time to develop instructional strategies, and insufficient technical and administrative support" (Javeri & Chen, 2006).

Ertmer (1999) also describes "second-order barriers," which are "intrinsic to educators and include beliefs about teaching, beliefs about computers, established classroom practices, and an unwillingness to change" (Javeri & Chen, 2006). In a later study, Becta (2004), considered Ertmer's (1999) second-order barriers and whether they related to the individual teacher (teacher-level), citing such factors as lack of time, and lack of confidence; or whether those barriers related on an institutional level (school-level), examining issues such as lack of effective training in solving technical problems and lack of access to resources. Becta (2004) concluded that "Recurring faults, and the expectation of faults occurring during teaching sessions, are likely to reduce teacher confidence and cause teachers to avoid using the technology in future lessons.

Ertmer's (1999) first and second order barriers can also be viewed from the perspective of resources and materials. Pelgrum (2001) explores these barriers as they impact both material and non-material facets of teaching. Material conditions may include the insufficient number of computers or copies of software. The non-material conditions

may include teachers' insufficient knowledge of available resources, ineffective professional development of technology skills, the difficulty of integrating technology into one's own instruction, and insufficient preparation time.

The NMC 2014 Horizon Report Johnson *et al.* (2014) suggests the need for not only students to have digital fluency, but for faculty members to have it as well. "Digital literacy has been deemed critically important to both students and instructors in higher education, but it is widely acknowledged that there is a lack of effective training to ensure that faculty are getting the skills they need to guide students. Georgina and Hosford (2009) and Fletcher (2006) agree that a call for more technological professional development for faculty seems to be warranted. Becta (2014) concluded that, "Any training program needs to ensure that teachers are made aware of the benefits of using technology.

Georgina & Hosford (2009) conducted a study of higher education faculty concerning their perceptions of technology integration and training. By administering a survey at the conclusion of a professional development workshop series on technology, they were able to examine the technology training and digital literacy of participants and study the impact that it had on their pedagogy. Georgina & Hosford (2009) found that, in terms of training,"56% of the faculty preferred small group training"; furthermore, in terms of integration or competency, "71.2% where found to be non-proficient" at utilizing online web space to teach a course within their content area. Based on these survey results, the researchers concluded that technology training should be "geared toward specific goals for specific faculty.

Hora & Holden (2013) examined the role that instructional technologies play in teacher reform efforts. The researchers looked at three distinct areas: (a) awareness of local resources for instructional technologies, (b) decision making processes regarding

technology use, and (c) actual classroom use of the technology. Interviews and classroom observations were conducted with over 40 faculty members in three different departments (math, physics, and biology) at three different universities across the U.S. The results indicated that the use of technology-based innovations was influenced by the desired learning goals for each department, perceived usefulness of the tool, and cultural conventions of the disciplines. Classroom use of the technology varied across the different disciplinary groups, with math and biology exhibiting relatively limited utilization.

Technology training can be considered from both a formal and an informal perspective. The technology training referenced in the preceding paragraphs would be considered formal training, taking place in a classroom or professional development setting. However, many technology-interested educators engage in learning about technology on their own; this is considered informal training. An emergent question for this paper is how the formal and informal learning experiences influence the implementation of technology at the classroom level.

This research study considers both the formal and informal technology training that an educator has had and uses that information to identify the individual's perceptions of the usefulness of technology in the classroom, as well as perceptions of his or her level and competency with technology integration. These perceptions of effective use of technology can also influence the use of technology in the teaching and learning environment as much as the formal technology training researched in the above studies. The Horizon Report (2014) also notes a resistance on the part of education faculty towards the use of different technologies, with a potential negative impact. "If they are reluctant to embrace new technologies and the promotion of digital literacy, students will not see the importance of these competencies to succeed in the workforce"

(Johnson *et al.,* 2014). Cope & Ward (2002) analyzed the perceptions of 15 veteran high school teachers who had little or no professional development in the use of technology in the classroom and found that these teachers were less likely to use it. These researchers state that "successful integration of learning technologies leading to enhanced learning outcomes is unlikely unless teachers perceive and use technology as an integral part of a student centered/conceptual change.

These researchers also found that, within this cross-section of teachers, "such perceptions are unlikely to lead to the use of learning technologies in the classroom in a manner that facilitates successful integration and enhanced learning outcomes". In a similar study, Royer (2002) found that the more teachers were involved in classroom technologies, the more likely those teachers were to use that technology for instruction. Could this lack of effective technology professional development (Cope & Ward, 2002), an unwillingness to embrace new technologies through integration into course work (Johnson, 2014), and the application of informal training to advance and enhance course learning objectives, as suggested by Russo *et al*. (2014) constitute themselves as an additional barrier, as seen in the work of Ertmer (1999)?

2.2.4 The role of school leadership in technology integration

School leadership can play a vital role in successful technology integration in classrooms and schools. School districts have a responsibility to create an environment that will provide not only sufficient access to computers and electronic networks, but also access that is significant enough to support the kinds of use that could make a notable difference in the classroom.

According to Fullan (2001) an effective school leader should possess characteristics such as an understanding of change, openness to innovation and a willingness to encourage learning and teaching. Administrators should expect teachers and students to

use technology in their teaching and learning activities, and as leaders in innovation, administrators should also embrace technology and make use of it themselves as part of their school's investment in technology.

Fullan (2011) defined the term “simplexity” to describe a simple yet complicated task. This concept lends itself to the notion of technology integration in schools. As an effective director of technology, one would understand the complexity of making a digital purchase (purchasing of digital devices), with the purpose of transforming the teaching and learning environment. The director of technology should attempt to simplify a complicated decision by considering the needs of the users and their ability to be effective with the digital devices that they are provided. The administrative decision makers intended to provide their teachers with the most up-to-date technology in order to give them the tools that they would need to better integrate technology into their daily instruction. This line of thinking would seem to make sense. If teachers are expected to instruct students in this digital age, then schools must supply the teachers with the appropriate tools to do so. The problem with this line of thinking lies in the design of the technology.

Choosing to use technology as part of a classroom learning activity or vehicle from which to facilitate the learning process may on the surface seem like a rather simple task. But, as we have seen, other variables such as technology training, perceptions derived from these formal and informal learning experiences, lack of access to digital devices, lack of technological support, and the time necessary for one to fully understand the operations of a digital device and its application in an existing curriculum are much more complex. As we have seen in the above example, the "simplexity" that Fullan (2011) speaks of has direct implications on the choices that teachers and administrators make when attempting to integrate technology into their classrooms.

Carkir (2012) states that computer teachers and technology integration specialists have an equally important role in integrating new developments into the educational environment, whereas administrators are responsible for prioritizing the use of new technologies in schools and ensuring that computer teachers are provided with the support that they require. Carkir's study showed that "today, educational leaders are making the necessary investments to ensure that technology is integrated into the teaching-learning process". At this point, it is a well-known fact that technology integration is a costly, ongoing expense. Funding of technology is not a one-time or one-budget-year expense, it's a recurrent investment on multiple levels that not all school districts can afford. In some cases, external sources of funding might be necessary to maintain not only meaningful technology integration but also functional technology-infused learning environments.

The benefit of incorporating technology into classrooms depends on teachers' meaningful integration to support learning objectives in new or varied ways. Savoy *et al.* (2009), point to the debate over the educational value of technology and highlight the need for a systematic evaluation concerning how well technology achieves the goal of improving learning.

In order to integrate computers into instruction, teachers must have access to technology. This access can only come from the actions and financial decisions of school leaders. Unfortunately, many teachers find hardware and software availability are limited in their schools. The cost of upgrades, support, and training, hardware and software are often not considered in school planning. The difficulties associated with technology integration are often attributed to the nature of existing curricula and instructional practices Edelson, (2001), lack of robust technological infrastructures and support

(Mistler-Jackson & Songer, 2000), and teacher abilities and skills (Chisholm & Wetzel, 2001).

Educational leaders and teachers need to factor in an understanding of the context within which the technology being adopted for classroom use was originally developed and the expertise associated with its implementation. Furthermore, they must consider the complex processes associated with the adoption, adaptation, and implementation of the technology as it is moved from everyday application to the context of a teaching and learning environment.

Today, teachers are faced with challenge to adequately address an ever-increasing range of student needs. Perhaps, more than ever, there is a need for educators to productively incorporate technology as an alternative method to enhance instruction. Teachers continually strive to acquire tools in order to empower students to accept new roles in their own learning and to expand their possibilities for collaboration and construction of knowledge; consequently, technology tools have added a new twist to the traditionalist way of instruction delivery, by providing many new opportunities for educators (Johnson, 2000). The impact of this study should provide some insight into teachers' perceptions of technology use, the perceived impact that the technology will have on the lesson and what if any, correlation can be made between these perceptions and TPACK scores.

2.2.5 How TPACK framework apply to the integration of technology

The complexity of general educational practice and specific classroom instruction is not adequately captured by focusing solely on how teachers use particular pedagogical techniques or digital tools (Halverson, 2003). Wright & Wilson (2011) studied ten teacher perceptions of technology use and integration in their classrooms--five years

after completing a teacher education program--which focused on technology use in the teaching and learning environment.

The researchers based their work on Hooper & Rieber's (1999) five phases of technology use familiarization, utilization, integration, reorientation, and evolution) to categorize their work and used it as a scale for technology engagement in the classroom.

Table 2.1 defines the categories, as based on the work of Hooper & Rieber (1999) with direct quotes from Wright & Wilson (2011).

Table 2. 1 Categories based on the work of Hooper and Rieber (1999)

Familiarization	**Learning on how to use technology**
Utilization	Trying the technology, but will not miss it if taken away
Integration	Using technology for certain tasks; designated uses
Reorientation	Using technology for more than delivery of content; focus is more students learning
Evolution	Continuing to evolve, adapting and integrating technology

Wright and Wilson (2011) found that teachers who were performing at the top levels of Hopper and Rieber's scale--reorientation and evolution--had received additional technology-specific professional development, utilized the available technology in their schools and obtained additional support from their school-based community. Smolin & Lawless (2011) considered the integration of technology as a result of ongoing professional development practices. Smolin and Lawless evaluated the ineffectiveness of technology integration professional development and discuss three specific collaborative evaluation models; examine key issues associated with implementing

them; and analyze how each model has the potential to strengthen and sustain professional development.

The researchers found that teachers deem professional development successful only if it deepens their teaching of a particular concept, helps them create instructional conditions conducive to student engagement, and fosters student learning of content. In particular, Smolin and Lawless advocate for more careful and more systematic approaches for documenting how technology integration occurs within schools, what increases its adoption by teachers, and the long-term impacts that these investments have on teachers and students.

Given evidence that instructional technologies can be used with varying degrees of pedagogical quality, it is important to go beyond accounting for whether or not an instructional technology is being used in the classroom. As much of the technology integration literature suggests, researchers should examine how these technologies are being used and to what ends (Aagaard. *et al.,* 2017).

When one considers how an educator plans for an instructional activity, it is typically conceptualized around content goals and organized according to learning activities. The application of a technology (integration) should be done so with the intent of enhancing the learning experience through innovative practices.

Technological, Pedagogical, and Content Knowledge (TPACK) is an organizational framework consisting of three major domains that support technology integration (Mishra & Koehler, 2008). This framework is utilized to understand a teachers' knowledge requirements for effective technology integration. TPACK examines the connections among technologies, curriculum content, and specific pedagogical approaches, demonstrating how content areas can interact with one another to produce

compelling discipline-based teaching with educational technologies. Within this framework, the three interdependent components of knowledge--content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK)--are all framed within and influenced by contextual knowledge. Mishra & Koehler (2006) explain: "There is no single technological solution that applies for every teacher, every course, or every view of teaching. Quality teaching requires developing a nuanced understanding of the complex relationships among technology, content, and pedagogy, and using this understanding to develop appropriate, context-specific strategies and representations".

Keatings & Evans (2001) explain that "technological pedagogical content knowledge extends beyond proficiency with technology for personal use to an understanding of how technology can be integrated with subject matter and the technology itself." The TPACK framework highlights the "connections, interactions, affordances, and constraints between and among content, pedagogy, and technology" (Mishra and Koehler, 2006). Topper (2005) believes that "for teachers to use technology in support of their teaching, and to see it as a pedagogically useful tool, they must be confident and competent with the technology they are planning to use". Koehler & Mishra (2005) "focus on a problem of practices and seek ways to use technology (and thereby learn about technology) to address the problem and to understand that technology has constraints, has breakdowns, and is context sensitive. Researchers generally agree that TPACK can serve as an appropriate framework that bridges teacher education and educational technology. What distinguishes TPACK from earlier frameworks is that it does not specify specific stages or levels of technology integration. Other models of technology integration, such as Substitution, Augmentation, Modification, and

Redefinition (SAMR), employ descriptive levels to determine how a piece of technology will be used (Hilton, 2016). These levels can change from class to class or

even lesson to lesson; consequently, the SAMR model categorizes the use of a particular piece of technology, rather than the pedagogical means behind the decision for its use. TPACK focuses on the pedagogy of technology use, rather than the technology itself. Both models are effective in their own unique application; for the purposes of this study, this research will consider the TPACK framework as a conceptual lens.

Technology is not a mere object to be introduced into teaching and learning activities at will without considering basic principles of learning and sound pedagogy. The teacher should consider how the selected technology fits into the objective of the lesson.

2.3 Empirical Studies on Lecturers' Awareness, Attitude and Perception towards the Utilization of CBLE for Teaching

Razak (2009) in his article "Cloud computing in Malaysia universities" mentioned that students in the 21st century have different and vast learning needs which no longer can be satisfied with traditional teaching and learning methodologies. It is now a fact that traditional methods are insufficient to address the needs of universities especially academics and students. The kind of skills students need to develop to be prepared for the industry nowadays is different from their forefathers. Universities are emphasizing more on higher order learning experiences and outcomes which requires a significant change in knowledge and communication-based society. According to Razak (2009) in a study titled "cloud computing an emerging computing model for delivering IT capabilities as a service". By using cloud computing in university users can access resources and services and perform functions with dynamically changing needs. Furthermore, by adapting to cloud computing applications, students and staffs can now gradually move both their work and used tools into the cloud, making both accessible from any computer, using tools that are free or very inexpensive. Cloud-based

applications can provide students and teachers with free or low-cost alternatives to expensive, proprietary productivity tools. Universities can take advantage of ready-made applications hosted on a dynamic, robust cloud that enable end users to perform tasks without having to acquire site licensing, installation, and maintenance of individual software packages. He also mentioned active communication and collaboration between academic researchers worldwide as another benefits of cloud computing in higher education system.

Dong *et al.* (2009) in his article about "An E-learning Ecosystem Based on Cloud Computing Infrastructure" mentioned that a cloud-based e-learning ecosystem is the next generation of e-learning. According to Dong current models of e-learning lack the support of underlying infrastructures, which dynamically allocate the required computation and storage capacities for an e-learning ecosystem. Cloud computing from other hand can provide tremendous value to e-learning ecosystems, due to its abilities of delivering computation and storage resources as services. Dong designed an e-learning ecosystem based on cloud computing infrastructure composed of three layers: Infrastructure layer, content layer, and application layer. Dong explained that, Infrastructure layer is the resource pool of an e-learning ecosystem. This layer supply computation and storage capacities for higher layers, it is the energy source of an e-learning ecosystem. Content layer mainly consists of e-learning contents, such as web file systems, database systems, web services, and so on. Application layer consists of e-learning services, systems, tools, and so on. Monitoring module is keeping track of the executions of requests, the real-time configuration information and resource utilization levels of species, including the health of CPU, memory, I/O, and so on. Finally Dong concludes that such system will be more reliable, flexible, and cost-efficient and self-regulated than traditional e-learning systems.

Mircea & Andreescu (2011) mentioned in their research about cloud computing as an alternative way to IT provision, management and security. According to them for implementing cloud computing technology in a university one must consider benefits, risks and limitation of cloud computing. According to Mircea & Andreescu (2011), the main benefits of using cloud computing in higher education are: access to applications from anywhere, classroom support for teaching and learning, reduction of cost of software license, 24 hours access to infrastructure and teaching materials, increased openness of students to new technologies. In addition they mentioned that, it is important to think about the consequences of not using this new technology in institution. Moreover one should not forgot, cloud computing ads value with small capital expenses, assuring at the same time the protection of the environment. In the end, universities may value the opportunities offered by cloud computing.

Gupta *et al.* (2011) of Indian Institute of Technology, designed and implement an academic cloud based learning system. It specifies the virtualization stack with KVM (Kernel-based Virtual Machine) hypervisor and libvirt API (Application Program Interface) used to construct a community cloud above the university infrastructure. In this utilization of lab resources has been shifted from 1-10% to 40-50%.This workflow provides IaaS of the cloud to the academic institution. This framework also requires an efficient load balancing approach to address the performance issues of cloud.

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Mathew, (2012) in his article titled as “Implementation of cloud computing in education- Educational cloud” mentioned that, cloud computing is the next generation platform for all institutions and organizations. In his paper Mathew showed that how cloud computing can be introduced to educational field for improving teaching, agility and cost effectiveness. Due to the higher accessibility, availability and efficiency of cloud services, many universities and businesses are trying to make use of these services. According to their needs universities can develop private or hybrid cloud systems which is called "educational cloud". Educational cloud can be accessible by many universities while private cloud is just accessible by one university. Educational cloud services can help the instructors to do their work on their web browsers. All of the information will be stored on cloud and that makes it easy to access from any place by any device. Also instructors will not worry about additional software licensing and backup and disaster recovery issues. Finally it can help instructors and students by increasing exposure to new IT technologies and having access to various universities and advanced researches.

Chunwijitra (2013) from The Graduate University for Advanced Studies (SOKENDAI) in his research “An Advanced Cloud-Based e-Learning Platform for

Higher Education for Low Speed Internet" implements new online authoring tools for e-learning systems (WEBELS) using Flash technology. The designed system was able to improve performance of online meeting system in the developing countries with low and unstable internet speeds .The proposed system was achieved and optimized to support the cloud computing technology since the technology is implemented in a wide variety of architectures, services, models, and other technologies.

Dhull, (2013) of Pacific University, proposed e-cloud model which provides opportunity of flexibility and adaptation to use the computing resources on-demand without physical purchasing or installation at user site. According to Kamal for "small collages which do have in-house servers and expert staff to support their distance learning might better to use public cloud for their online courses, but for the large universities whom already invest on their IT infrastructure for years, planning on hybrid cloud is more efficient. In his research Kamal designed a model called cloud campus which empowers the student to learn on his own terms, at his own pace, wherever and whenever he wants it.

Huang & Liu (2013) in their article about "construction of collaborative learning environment by cloud computing" mentioned that, In the field of education, cloud computing, as a basic environment and platform for the future network learning, will bring positive effect on construction of the learners' personal learning environment. Currently Google and Baihui are considered to be best teaching cloud platform. Google Sites is a pioneer in teaching applications, and now many teaching practice and researches supported by cloud computing are conducted on Google Sites. Many google application services such as google doc, google spreadsheet, google drive and google slide are used by students every day. Also Baihui Network, a leading enterprise cloud

computing service provider, providing more than 20 models of cloud computing applications, has become an important platform for many SMEs, including Baihui Office, Cloud-mail, document-storage collaborative, instant messaging, calendar, forum, knowledge management, cloud development platforms and so on. In teaching, under specific circumstances, teachers and students can freely combine Baihui cloud computing applications, creating opening and personalized teaching environment to bring to play a huge advantage in teaching. Baihui offers educational services such as online editing document, storing, chatting, conference and many other interaction and communication tools to students and teachers. There are many other cloud based educational applications and services, adaptation of such technologies will be increase rapidly in future.

Karim & Goodwin (2013) in his article mentioned several challenges are face the efficient deployment of e-learning system but by using cloud computing solutions we can overcome these problems. According to Karim & Goodwin (2013) lack of a proper infrastructure, lack of curriculum, lack of maintenance and technical support and challenges of changing management, are the issues that traditional e-learning platforms are facing but with use of cloud-based platform it is easy to solve these problems. Karim believe by using cloud solutions we can centralize our infrastructure and reduce the repeated tasks, costs and time. Also Cloud computing can enhance readiness in two key ways by providing an easy to use platform for teachers and students to access from anywhere there is a device with an internet connection. Moreover technical support time is reduced with a cloud-based system because cloud technology utilizes a centralized infrastructure approach that reduces the need to spend time on issues such as service availability, and application compatibility by providing and delivering services through a browser. Finally With the use of clouds the managing of e-learning system can be

deployed and spread over the organization more quickly, and people are more likely to identify the value of the system and to realize they need to utilize it in their daily lives. Karim conclude that since the speed and stability of internet is improving so popularity of cloud computing in e-learning will increase very much in future.

Attis, (2014) of Liberty University, in its research on "an investigation of the variables that predict teacher e-learning acceptance" validate the technology acceptance model which make instructors have more tolerant in receiving new e-learning technologies. According to this research many teachers will not have a choice between teachings in traditional or e-learning format, the world is changing and the need of basing education on technology is essential and for that universities and governments should join their effort to increase e-learning technology 27acceptance in universities. This study also suggest that traditional teachers and online teachers should support each other instruction and help to create better online learning environment for all students and instructors.

In a similar vein, Oyeleye *et al.* (2014) carried out a study to investigate the impact and challenges of the adoption of cloud computing by public universities in the southwestern part of Nigeria. A sample of 100 IT staff, 50 para-IT staff and 50 students each was selected from 10 public universities in the southwest. The researchers adopted a descriptive survey for the study. The study employed a structured questionnaire titled “The Evaluation of the Impact and Challenges of Cloud adoption and Use on Universities in Southwestern Nigeria.” The instrument has a Cronbach Alpha reliability coefficient of 0.89. Frequency and percentage distributions were used to analyze collected data. The outcome of the study indicated a mere 10% adoption of cloud computing by Nigerian public universities, with the service model distribution represented as PaaS: 20%, IaaS: 10%, and SaaS: 70%. This distribution corroborates the

report of Johnson & Hiran (2014) that the highest numbers of cloud consumers subscribe to SaaS. Still, this study fall short of specifics, not relating how students utilize the services directly in their platform.

Atchariyachanvanich *et al.* (2014) of King Mongkut's Institute of Technology in its research "What Makes University Students Use Cloud-based E-Learning?" mentioned that cloud based e-learning in an integration of both technologies that evolve collaborative learning function and stable anytime, anywhere, any device, access to all students and academic staff. According to the institute "students who have used cloud based e-learning system have more motivation and interest in continue learning through this system for three main reasons: (collaboration, availability, notification). First reason is the ability of collaboration learning in this system which make it possible for two people or more, can study and work together in order to complete the assigned tasks. The second reason is availability of cloud system which establishes an anytime, anyplace, any device study environment. Finally this study proposes that notification characteristic of this platform is the most significance factor, it keeps users informed about events by delivering its information to the destination devices, such as the computer screen or mobile device." Therefore, according to the findings of this study students prefer cloud platform in e-learning system because they feel more intrinsic and extrinsic motivation when the system is available to use all the time.

Selviandro *et al.* (2014) from Telkom University of Indonesia believe that uneven distributed resources, limited service provider and concentration of qualified educator resources in only specific areas are the obstacle that students are facing in educational institution. Therefore he proposes architecture of cloud-based learning to solve this obstacle and limitations. This system is called as Indonesia Open Educational Resources (IOER). (Selviandro *et al.,* 2014) designed his system personalized e-learning services

and shared large storage and other programs and learning facilities between learners. Based on system testing results Selviandro *et al.* (2014) conclude that cloud-based learning can meet users need by presence of simple infrastructure and easy access for users. Along with that his evaluation showed that by implementing he cloud based open learning portal could decrease the infestations cost up to 59% in compares to non-cloud e-learning systems and showed that the results is 43,9% percentage that means by using cloud based system could give more benefits than using non cloud based system.

Lim *et al*. (2015) in her article titled as "The beliefs and perceptions of Swedish school principals" explored the schools that adopting cloud services in their environment. In this research Lim did an online survey and response on Swedish primary and high schools. The survey comprises four sections: technology beliefs, perceived benefits of cloud computing, perceived obstacles of cloud computing, and demographics. In this research Lim indicate that many Swedish school teachers believe that it is feasible to incorporate such technology into the curriculum. Moreover, the research showed that, the use of cloud computing is expected to enhance student motivation to study. Principals were also asked to identify the most important cloud computing application in their schools and according to the answered Google Drive, DropBox, OneDrive, and iCloud where the most popular cloud applications. This study emphasizes the importance of understanding the beliefs and perceptions of the principals in the adoption decision. Data gathered from an online survey show that school principals in Sweden have strong positive beliefs toward cloud computing and they consider file storage systems to be the most useful. On the whole, the level of perceived benefits of cloud computing is rather high and the level of perceived obstacles is relatively low.

Al-fahad (2009) carried out a research to better understand and measure students' attitudes and perceptions towards the effectiveness of mobile learning. This paper

reports on the results of a survey of one hundred eighty-six undergraduate female students at King Saud University about their attitude and perception to the use of mobile technology in education. An analysis of the quantitative survey findings is presented focusing on the ramification for mobile-learning (m-learning) practices in university learning and teaching environments. The author has attempted to determine how this technology can be optimally used to improve student retention at Bachelor of Art and Medicine programmed at King Saud University in Saudi Arabia. Result of this survey clearly indicate that offering mobile learning could be our method for improving retention of Bachelor of Art (B.A) and Medicine (M.D). students, by enhancing their teaching/ learning. The biggest advantage of this technology is that it can be used anywhere, anytime and adopt their mobile learning systems with the aim of improving communication and enriching students' learning experiences in their open and distance learning.

Chukwuemeka (2010) reported that less experienced secondary school lecturers' are more exposed to the use of ICT/ Social Media than moderately and highly experienced lecturers'. Also, that female teachers have little awareness and skills in using internet for teaching and learning process.

Onasanya *et al.* (2010) surveyed the attitude of lecturers towards integration of Information and Communication Technologies (ICTs) in tertiary institutions in Kwara State, Nigeria. To elicit responses for the study, four research hypotheses were formulated. One hundred and fifty lecturers, 90 males and 60 females from three tertiary institutions in Kwara State participated in the study. Data were collected for the study through the administration of 29-item questionnaire. A test re-test method was used to determine the reliability of the instrument, the result was appropriately scored. The data obtained were analysed using t-test and ANOVA in testing the hypotheses. The findings

showed that gender has no effects on the attitudes of lecturers towards integration of ICT into teaching and research in tertiary institutions. Science oriented lecturers attitudes towards integration of ICT in tertiary institution is higher than other non science oriented lecturers. Less experienced lecturers are more exposed to the use of ICT than moderately and highly experienced lectures. University lecturers acquired more ICT skills than their counterparts in polytechnics and colleges of education. Many lecturers lacked adequate training and competence in using computer as a tool for effective teaching and research purposes. It was recommended among other things, that higher institutions should encourage their lecturers to be computer literate by organising conferences, seminars and workshops. Old lecturers should be encouraged to develop good attitudes toward the use of ICT for teaching and research work. Recommendations were made toward effective integration of ICTs in tertiary institutions in Nigeria.

Yuan & Lee (2012) investigated elementary school teachers' perceptions toward to the use of ICT. Magic Board, an interactive web-based environment which provides a set of virtual manipulatives for elementary mathematics, is used as the case of ICT. After participating in Magic Board workshops, 250 elementary school teachers in Taiwan responded to a researcher developed questionnaire to get teachers' perceptions toward the use of Magic Board. The study revealed that teachers rated high scores on perceived teaching assistance, perceived learning assistance, and perceived competence of technology integration. The correlation among the three subscales indicates that teachers had a higher score on one scale correlated with higher scores on the other two scales. Findings show no gender difference on perceptions toward Magic Board. However, teachers who have data projectors in their classrooms rated higher scores on perceived teaching assistance and perceived competence of technology integration than

those without data projectors in their classrooms. Lastly, this study discusses implications for these results and recommendations for future research.

Samson-Akpan *et al.* (2016) investigated nurse educators' perception of problem-based learning in order to provide useful information for necessary intervention. The study was a descriptive survey. A convenience sampling technique was used and 40 nurse educators out of 58 in Calabar participated in the study. Furthermore, 6 out 10 nursing educational institutions in Cross River State were used. A self-developed and well validated questionnaire served as an instrument for data collection. Data were analyzed using SPSS version 15. Descriptive statistics was used for data analysis. The results revealed that most of the respondents 29(75.5%) were females. With regards to professional and educational qualifications, all the respondents were registered nurses and most of the respondents were B.N.Sc./BSc./B. Ed degree holders 16(40%), while Masters' Degree holders were 15 (37.5%). The results revealed that majority of the respondents had a positive view and attitude towards problem-based learning and would like it to be introduced into nursing educational institutions. The study suggests that nurse educators will be positively disposed to the use of problem-based learning in teaching-learning process as it is being used in most professional courses in developed and developing countries. Therefore, it was suggested that all stakeholders in nursing educational institutions should organize workshops and seminars to orientate nurse educators on problem-based learning. The curriculum for training of student nurses should be reviewed to reflect problem-based learning.

Ogirima *et al.* (2017) examined teachers' attitude and competence in the use of assistive technologies in special needs schools. The descriptive survey method was employed for the study among 100 teachers who were drawn using purposive sampling technique from special needs schools in Osun State, Nigeria. Six research questions were

generated while four hypotheses were tested at 0.05 level of significance. A researcher-constructed questionnaire tagged “Teachers’ Attitude and Competence in the Use of Assistive Technology Questionnaire (TACUATQ)” was used for data collection. The instrument was administered on 20 selected teachers outside the sample location through test-retest method; it yielded a reliability coefficient of 0.85 through Pearson Product Moment Correlation statistics. Data were analysed with percentage, mean and rank order, t-test and ANOVA statistical tools. The findings revealed that teachers have a positive attitude towards the use of assistive technologies. However, teachers were not competent in the use of assistive technologies. Gender and teaching experience did not influence teachers’ attitude and competence in the use of assistive technologies. It was recommended among other things that teachers should be trained and re-trained on the use of assistive technology for students with speech disorders, visual impairments, hearing impairments, physical impairments and emotional and behavioural disorders.

2.4 Summary of Literature Reviewed

The importance of cloud base computing cannot be overemphasized especially in the educational setting. In the past decades the importance of IT has experienced tremendous growth due to its application in all areas of human endeavor. The emergence of Information and Communication Technology (ICT) is seen as one of the major breakthroughs in teaching and learning process. The ability of lecturers to administer and disseminate knowledge through technologies has also provided new opportunities for learners to acquire new skills and knowledge.

The capacity to use computers and computing technologies efficiently has become a crucial part of education. The demand for computer and ICT literacy skill keeps on increasing in Nigeria every day, because higher institutions realize that with the acquired skills, workers can boost their efficiency and can go about their work

effectively and efficiently. Employees (lecturers) on the other hand have also seen the need to be computer savvy as they realized that computer can be a treat to their jobs, and having these required skills their jobs can be secured. Institutions are now seeing the need to train and re-train its staff to establish or enhance their knowledge of computing and computing technologies.

The study seeks to determine the lecturers' awareness, attitude and perception towards the utilization of cloud-based learning environment in tertiary institutions in Kebbi State. The main variables in the study are awareness, attitude, perception, and cloud base learning environment were extensively discussed.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Design

A descriptive research design was adopted. The reason for the choice in the adoption of a descriptive research design is because, the research questions were answered based on the data collected through questionnaire. The descriptive survey design is used to describe the distinctiveness of individual or group, the relationship that exists between variables and described them. In this study, the instrument that was used to collect data was questionnaire that was designed by the researcher in order to elicit needed information from the respondents on lecturers' awareness, attitude and perception towards the utilization of cloud-based learning environment in tertiary institutions in Kebbi State, Nigeria.

3.2 Population of the Study

The population of the study comprised of 650 lecturers from the tertiary institutions in Kebbi State. There are five tertiary institutions in Kebbi State, the institutions include: Federal University Birnin Kebbi, Kalgo, Kebbi State University of Science and Technology, Aleiro, Umaru Waziri Federal Polytechnic Birnin Kebbi, Kebbi State Polytechnic Dakingari, Federal College of Education, Argungu. The target population for this study comprised 280 lecturers from four higher institutions of learning in Kebbi State, namely; Federal University Birnin Kebbi, Kebbi State University of Science and Technology Aleiro, Federal Polytechnic Birnin Kebbi and Kebbi State Polytechnic Dakingari.

3.3 Sample and Sampling Techniques

A purposive random sampling technique was employed in selecting four tertiary institutions of learning in Kebbi State owned by the Federal and State government,

because science courses are offered in these institutions. Sample selected cut across both the male and female lecturers in the selected tertiary institutions of learning.

Thereafter, a stratified sampling procedure was also used for the selected 160 lecturers from four tertiary institutions of learning in Kebbi State. Stratified sampling is a type of sampling method in which the total population is divided into smaller groups or strata to complete the sampling process. The strata are formed based on some common characteristics in the population data. After dividing the population into strata, the researcher randomly selects the sample proportionally.

The sample is in accordance with Krejcie and Morgan (1970) sample size determination table. This method gives each member of the population an equal chance of being represented. Science lecturers were selected as sample reasons been that, it is difficult to sample lecturers from all academic discipline and considering the fact that the only faculty that is mostly common to all institutions in Kebbi State is Faculty of Sciences.

3.4 Research Instrument

The research instrument that was used in this study was the questionnaire that was designed by the researcher. The questionnaire is titled "Lectures Awareness, Attitude and Perception towards the utilization of Cloud Base Learning Environment (LAAPUCBLEQ). In constructing the questionnaire, effort was made to see that the instructions were precise and clear to the respondents. The questionnaire was divided into four sections A, B, C and D. Section A consists of demographic information about the respondents. Section B consists of statements to assess Lecturers' level of Awareness of Cloud Base Learning Environment using Completely Aware (CA) awarded 4 points, Aware (A) awarded 3 points, Not Completely Aware awarded (NCA) awarded 2 points, and Not Aware (NA) awarded 1point scale. For section C and D

statements on lecturer's Attitude and Perception towards the utilization of CBLE for learning using Likert scale of Strongly Agee (SA) awarded 5 points, Agree (A) awarded 4 points, Undecided (U) awarded 3 points, Disagree (D) awarded 2 points, and Strongly Disagree (SD) awarded 1 point scale.

3.5 Validation of the Research Instrument

The instrument was validated by three experts, two from the Department of Educational Technology, Federal University of Technology Minna, Niger State and the other a psychologist from College of Education Minna. Face validity was carried out by the researcher. It looked at the logical arrangement of the items in the question or construct that is supposed to measure while. Content validity is the estimate of how much a measure represents every single element of a construct. Face and content validity of the research instrument were done by these experts. Notable inputs were made by the experts. Their suggestions and corrections were effected by the researcher.

3.6 Reliability of the Research Instrument

A pilot test was conducted to determine the reliability of the test instrument. A total number of 20 lecturers from Kebbi State University of Science and Technology Aleiro who were part of the population but not part of the sample for this study were selected for the pilot study since they share related characteristics. The administration was done once and a reliability coefficient of 0.85, 0.92 and 0.84 from the variable awareness, attitude and perception was obtained using Cronbach Alpha formula. Reliability coefficients above 0.70 are considered acceptable (George & Mallery, 2003). Based on the coefficient obtained, the instrument was considered reliable.

3.7 Method of Data Collection

A letter of introduction was obtained from the researcher's institution of learning with the sole aim of using it to obtain permission and approval to sample lecturers from department under which the institution for the research is targeted. A research assistant was trained on the fundamental principles of data collection as regarding the study by the researcher. Thereafter, the researcher and trained research assistant administer the questionnaire on the sampled lecturers. The completed copies of the questionnaire were collected from the respondents for further analysis.

3.8 Method of Data Analysis

The data collected from the sampled lecturers were analyzed using descriptive and inferential statistics. The descriptive statistics was used to provide answers to the research questions using mean and standard deviation. In section B, C and D of the questionnaire, the mean response below 3.0 was adjudged as "not aware", while mean response of 3.0 and above was adjudged as "being aware", Similarly, in section C, a mean response below 3.0 was adjudged as "not agree", while mean response of 3.0 and above was adjudged "agree", similarly, in section D, a mean response below 3.0 was adjudged "not agreed", while mean response of 3.0 and above was adjudged "agreed". Analysis of variance (ANOVA) statistics was used to test the research hypotheses 1, 3 and 5 and t-test analysis was used to test research hypotheses 2, 4 and 6, the significant difference was ascertained at alpha level of 0.05. The Statistical Package for Social Science (SPSS Version 20) was used.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Results

The data collected for the purpose of this study were analyzed based on the research questions and the hypotheses formulated.

Research Question One: To what extent are lecturers of tertiary education institutions aware of cloud-based teaching environment?

In answering research question one, on the extent of lecturers' awareness of cloud-based learning environment in tertiary education institutions in Kebbi State, Mean and Standard Deviation was used to answer the research. This is shown in Table 4.1.

Table 4.1: Lecturers' Awareness of Cloud-based Learning Environment in Tertiary Education Institutions In Kebbi State

S/N	Item	N	$\bar{X}$	SD	Decision
1.	CBLE is in existence.	160	4.78	0.78	Agree
2.	CBLE are readily available for use.	160	4.23	0.67	Agree
3.	CBLE provide quality free platform for teaching.	160	4.11	0.45	Agree
4.	CBLE can be used to provide instructional materials.	160	4.22	0.88	Agree
5.	CBLE could not be used to compliment normal classroom teaching and learning	160	3.49	1.47	Agree
6.	CBLE can be freely shared.	160	3.59	1.22	Agree
7.	CBLE can provides feedbacks to teaching and learning activities	160	3.69	1.37	Agree
8.	CBLE could enhance innovation among lecturers.	160	4.19	1.04	Agree
9.	CBLE encourage globalization of curriculum.	160	4.13	0.98	Agree
10.	CBLE utilization can advance openness and sharing of intellectual property.	160	4.27	0.77	Agree
	Average Mean		**4.07**		

Table 4.1 showed the mean response on lecturers' awareness of cloud-based learning environment in tertiary education institutions in Kebbi State. A total number of 160 lecturers responded to the questionnaire. The table showed that the average mean for the response was 4.07 and Standard Deviation was 1.11. This indicates that lecturers are aware of cloud-based learning environment in tertiary education institutions in Kebbi State.

Research Question Two: Does gender influence lecturers' awareness of cloud-based teaching environment for teaching in Kebbi State?

In answering research question two, on influence of gender on lecturers' awareness of cloud-based learning environment for teaching in Kebbi State, Mean and Standard Deviation was used to answer the research. This is shown in Table 4.2.

Table 4.2 Mean and Standard Deviation of Male and Female Lecturers' Awareness of Cloud-based Learning Environment

Gender	N	Mean	SD
Male	69	72.78	6.84
Female	91	73.01	11.44

Table 4.2 shows the mean scores of responses of lecturers' awareness of cloud-based learning environment for teaching in Kebbi State. From the above table, it was observed that the mean scores of the two groups were different where male lecturers had mean scores of 72.78 with Standard Deviation of 6.84, female lecturers had mean scores of 73.01 with Standard Deviation of 11.44. This shows that gender does not influence lecturers' awareness of cloud based learning environment for teaching in Kebbi State.

In answering research question three, on the attitudes of lecturers towards utilization of cloud-based learning environment, Mean and Standard Deviation was used to answer the research. This is shown in Table 4.3.

Table 4.3: Attitudes of Lecturers Towards Utilization of Cloud-Based Learning Environment

S/N	Item	N	$\bar{X}$	SD	Decision
1.	Using CBLE services is good	160	4.67	0.89	Agree
2.	The students can get a better learning outcome when they use CBLE services.	160	3.94	0.99	Agree
3.	Using my knowledge of ICT to access CBLE services is favorable.	160	4.10	0.75	Agree
4.	Using CBLE services for teaching and learning can be effective and efficient	160	3.97	0.94	Agree
5.	It is a positive influence for me to use CBLE servers.	160	4.45	0.84	Agree
6.	My using CBLE services for research is good.	160	4.23	0.97	Agree
7.	It is good to use CBLE services in the classroom.	160	4.13	0.86	Agree
8.	CBLE are available at reduced cost.	160	3.70	1.16	Agree
9.	Using cloud services in teaching is worth the extra effort.	160	4.28	0.81	Agree
10.	CBLE can be used by other discipline in the institution.	160	4.32	0.74	Agree
	Average Mean		**4.18**		

Table 4.3 showed the mean response on attitudes of lecturers towards utilization of cloud-based learning environment in tertiary education institutions in Kebbi State. A total number of 160 lecturers responded to the questionnaire. The table showed that the average mean for the response was 4.18 and Standard Deviation was 0.97. This indicates that lecturers have positive attitude towards utilization of cloud-based learning environment in tertiary education institutions in Kebbi State.

In answering research question four, on influence of gender on lecturers' attitude towards the utilization of cloud-based learning environment for teaching in Kebbi State,

Mean and Standard Deviation was used to answer the research. This is shown in Table 4.4.

Table 4.4 Mean and Standard Deviation of Male and Female Lecturers' Attitudes towards Utilization of Cloud-based Learning Environment

Gender	N	Mean	SD
Male	69	71.77	7.81
Female	91	73.80	10.48

Table 4.4 shows the mean scores of response of lecturers' attitude towards utilization of cloud-based learning environment for teaching in Kebbi State. From the above table, it was observed that the mean scores of the two groups were different where male lecturers had mean scores of 71.77 with Standard Deviation of 7.81, female lecturers had mean scores of 73.80 with Standard Deviation of 10.48. This shows that gender does not influence lecturers' attitude towards utilization of cloud based learning environment for teaching in Kebbi State.

In answering research question five, on lecturers' perception towards the utilization of cloud-based learning environment for teaching in Kebbi State, Mean and Standard Deviation was used to answer the research. This is shown in Table 4.5.

Table 4.5: Lecturers' Perception Towards Utilization of Cloud-Based Learning Environment

S/N	Item	N	$\bar{X}$	SD	Decision
1.	Will be useful in teaching and learning activities.	160	4.91	0.86	Agree
2.	Will provide supplementary teaching and learning materials	160	4.22	0.72	Agree
3.	Can be of great advantages to teaching pedagogy.	160	4.13	0.75	Agree
4.	Will reduce the cost of other e-learning platform.	160	4.05	0.84	Agree
5.	Can increase educational opportunities for lecturers and students who cannot be in the	160	4.39	0.81	Agree

	classroom.				
6.	Will serve as global interactive platform for lecturers.	160	4.45	0.76	Agree
7.	Will assists institutions to have quality materials	160	4.19	0.82	Agree
8.	Can provide me with the ability to access global academic curriculum at a detailed level.	160	4.38	0.84	Agree
9.	Will give me opportunity to research on new development in my area of specialization.	160	4.25	0.80	Agree
10.	Can be of questionable quality	160	3.84	1.05	Agree
	Average Mean		**4.28**		

Table 4.5 showed the mean response on perception of lecturers towards utilization of cloud-based learning environment in tertiary education institutions in Kebbi State. A total number of 160 lecturers responded to the questionnaire. The table showed that the average mean for the response was 4.28 and Standard Deviation was 0.85. This indicates that lecturers have high and positive perception towards utilization of cloud-based learning environment in tertiary education institutions in Kebbi State.

In answering research question six, on influence of gender on lecturers' perception towards the utilization of cloud-based learning environment for teaching in Kebbi State, Mean and Standard Deviation was used to answer the research. This is shown in Table 4.6.

Table 4.6 Mean and Standard Deviation of Male and Female Lecturers' Perception towards Utilization of Cloud-based Learning Environment

Gender	N	Mean	SD
Male	69	79.04	10.96
Female	91	79.03	10.05

Table 4.6 shows the mean scores of response of lecturers' perception towards utilization of cloud-based learning environment for teaching in Kebbi State. From the above table,

it was observed that the mean scores of the two groups were different where male lecturers had mean scores of 79.04 with Standard Deviation of 10.96, female lecturers had mean scores of 79.03 with Standard Deviation of 10.05. This shows that gender does not influence lecturers' perception towards utilization of cloud based learning environment for teaching in Kebbi State.

4.2 Hypotheses Testing

The data collected was analyzed using inferential statistics which are t-test and Analysis of Variance (ANOVA)

HO_1: There is no significant difference in the level of awareness of lecturers on the existence of Cloud Base Learning for teaching based on their years of experience.

The data collected was analyzed using Analysis of Variance which is reported in Table 4.7.

Table 4.7: Summary of ANOVA Result on Level of Awareness of Lecturers on the Existence of Cloud Base Learning for Teaching based on their years of experience

Source of Variation	Sum of Squares	df	Mean Squared	F-Value	P-value
Between Groups	219.625	2	109.813	1.169	0.313
Within Groups	14747.150	157	93.931		
Total	14966.775	159			

Table 4.7 shows the ANOVA comparison of level of awareness of lecturers on the existence of Cloud Base Learning for teaching based on their years of experience. An examination of the Table shows no significant difference in the three groups F (2, 157) = 1.169, P-Value = 0.313, $p > 0.05$). Hence, the hypothesis was retained. This showed

that there is no significant difference in the level of awareness of lecturers on the existence of Cloud Base Learning for teaching based on their years of experience.

In testing hypothesis two, t-test analysis was used which is presented in Table 4.8.

HO_2: There is no significant difference between male and female lecturers' awareness of the existence of Cloud Based Learning for teaching.

Table 4.8: Summary of independent t-test Analysis on Level of Awareness of Lecturers on Existence of Cloud-Based Learning

Group	N	df	$\bar{X}$	SD	t-value	P-value
Male	69		72.78	6.84		
		158			0.09	0.99
Female	91		73.01	11.44		

Table 4.8 shows the t-value was 0.09 the P-value was 0.99 which is P>0.05. This means it was not significant as such hypothesis two was accepted. From the above table, it was observed that the mean scores of the two groups were different where male lecturers had mean scores of 72.78 with Standard Deviation of 6.84, female lecturers had mean scores of 73.01 with Standard Deviation of 11.44. This shows that there was no significant difference in the level of awareness of lecturers on the existence of Cloud Base Learning for teaching.

In order to test hypothesis three, Analysis of Variance (ANOVA) was used which is presented in Table 4.9.

HO_3: There is no significant difference in lecturer's attitude of Cloud Base Learning Environment for teaching based on their years of experience.

Table 4.9: Summary of ANOVA Result on Lecturer's Attitude of Cloud-Based Learning Environment for Teaching based on their years of experience

Source of Variation	Sum of Squares	df	Mean Squared	F-Value	P-value
Between Groups	260.923	2	130.462	1.469	0.233
Within Groups	13946.177	157	88.829		
Total	14207.100	159			

Table 4.9 shows the ANOVA comparison on lecturers' attitude of Cloud Base Learning for teaching based on their years of experience. An examination of the Table shows no significant difference in the three groups F (2, 157) = 1.149, P-Value = 0.23, p > 0.05). Hence, the hypothesis was accepted. This showed that there is no significant difference in lecturer's attitude of Cloud Base Learning Environment for teaching based on their years of experience

In testing hypothesis four, t-test analysis was used which is presented in Table 4.10.

HO_4: There is no significant difference between male and female lecturer's attitude towards the use of Cloud Base Learning Environment for teaching.

Table 4.10: Summary of t-test Analysis on Male and Female Lecturers' Attitude towards the Use of Cloud-Based Learning Environment for Teaching

Group	N	df	$\bar{X}$	SD	t-value	P-value
Male	69		71.77	7.81		
		158			0.22	0.18
Female	91		73.80	10.48		

Table 4.10 shows the t-value was 0.22 the P-value was 0.18 which is P>0.05. This means it was not significant as such hypothesis four was accepted. It was observed that

the mean scores of the two groups were different where male lecturers had mean scores of 71.77 with Standard Deviation of 7.81, female lecturers had mean scores of 73.80 with Standard Deviation of 10.48. This shows that there was no significant difference between male and female lecturer's attitude towards the use of Cloud Base Learning Environment for teaching.

In order to test hypothesis five, Analysis of Variance (ANOVA) was used which is presented in Table 4.11.

HO_5: There is no significant difference in lecturer's perception towards the utilization of Cloud Base Learning Environment for teaching based on their years of experience.

Table 4.11: Summary of ANOVA Result on Lecturer's Perception towards the Utilization of Cloud-Based Learning Environment for Teaching based on their years of experience

Source of Variation	Sum of Squares	df	Mean Squared	F-Value	P-value
Between Groups	98.640	2	49.320	0.450	0.638
Within Groups	17189.135	157	109.485		
Total	17287.775	159			

Table 4.11 shows the ANOVA comparison on lecturers' perception towards the utilization of Cloud Base Learning for teaching based on their years of experience. An examination of the Table shows no significant difference in the three groups F (2, 157) = 1.45, P-Value = 0.638, $p > 0.05$). Hence, the hypothesis was accepted. This showed that there is no significant difference in lecturer's perception towards the utilization of Cloud Base Learning Environment for teaching based on their years of experience.

In testing hypothesis six, t-test analysis was used which is presented in Table 4.12.

HO_6: There is no significant difference between male and female lecturers' perception towards the utilization of Cloud Base Learning for teaching.

Table 4.12: Summary of t-test Analysis on Male and Female Lecturers' Perception towards the Use of Cloud-Based Learning Environment for Teaching

Group	N	df	$\bar{X}$	SD	t-value	P-value
Male	69		79.04	10.968		
		158			0.09	0.99
Female	91		79.03	10.059		

Table 4.12 shows the t-value was 0.09 the P-value was 0.99 which is P>0.05. This means it was not significant as such hypothesis six was accepted. From the above table, it was observed that the mean scores of the two groups were different where male lecturers had mean scores of 79.04 with Standard Deviation of 10.96, female lecturers had mean scores of 79.03 with Standard Deviation of 10.05. This shows that gender does not influence lecturers' perception towards utilization of cloud based learning environment for teaching in Kebbi State. This shows that there was no significant difference between male and female lecturers' perception towards the utilization of Cloud Base Learning for teaching.

4.3 Summary of Findings

1. It was found that there is no significant difference in the level of awareness of lecturers on the existence of Cloud Base Learning for teaching based on their years of experience.
2. Finding revealed that there was no significant difference in the level of awareness of lecturers on the existence of Cloud Base Learning for teaching.

3. It was revealed that there is no significant difference in lecturers' attitude towards the utilization of Cloud Base Learning for teaching based on their years of experience.
4. It was found out that there was no significant difference between male and female lecturer's attitude towards the use of Cloud Base Learning Environment for teaching.
5. The finding showed that there is no significant difference in lecturer's perception towards the utilization of Cloud Base Learning Environment for teaching based on their years of experience.
6. Finding revealed that there was no significant difference between male and female lecturers' perception towards the utilization of Cloud Base Learning for teaching.

4.4 Discussion of Findings

It was found that there is no significant difference in the level of awareness of lecturers on the existence of Cloud Base Learning for teaching based on their years of experience. Also, finding revealed that there was no significant difference between male and female in the level of awareness of lecturers on the existence of Cloud Base Learning for teaching. This finding was supported by the finding of Chukwuemeka (2010) who reported that less experienced secondary school tutors are more exposed to the use of ICT/ Social Media than moderately and highly experienced lecturers'. Findings also indicated that female teachers have little awareness and skills in using internet for teaching and learning process.

It was revealed that there is no significant difference in lecturer's attitude to Cloud Base Learning Environment for teaching based on their years of experience. Also, it was found out that there was no significant difference between male and female lecturer's

attitude towards the use of Cloud Base Learning Environment for teaching. This finding is in support of Al-fahad (2009) who carried out a research to better understand and measure students' attitudes and perceptions towards the effectiveness of mobile learning and observed that offering mobile learning could be our method for improving retention of students, by enhancing their teaching/ learning. One of advantage of this technology is that it can be used anywhere, anytime and adopt their mobile learning systems with the aim of improving communication and enriching students' learning experiences in their open and distance learning. Similarly, the finding agree with the finding of Onasanya, et al (2010) on the surveyed study on attitude of lecturers towards integration of Information and Communication Technologies (ICTs) in tertiary institutions in Kwara State. The researcher observed that gender has no effects on the attitudes of lecturers towards integration of ICT into teaching and research in tertiary institutions.

Science oriented lecturers attitudes towards integration of ICT in tertiary institution is higher than other non-science oriented lecturers. Less experienced lecturers are more exposed to the use of ICT than moderately and highly experienced lecturers. University lecturers acquired more ICT skills than their counterparts in polytechnics and colleges of education. Many lecturers lacked adequate training and competence in using computer as a tool for effective teaching and research purposes. It was recommended among other things, that higher institutions should encourage their lecturers to be computer literate by organising conferences, seminars and workshops. All lecturers should be encouraged to develop positive attitudes towards the use of ICT for teaching and research work. Recommendations were made towards effective integration of ICTs in tertiary institutions in Nigeria.

In the same vein, the findings agree with (Ogirima *et al.,* 2017) who examined teachers' attitude and competence in the use of assistive technologies in special needs schools and

observed that teachers have a positive attitude towards the use of assistive technologies. However, teachers were not competent in the use of assistive technologies. Gender and teaching experience did not influence teachers' attitude and competence in the use of assistive technologies.

The finding showed that there is no significant difference in lecturer's perception towards the utilization of Cloud Base Learning Environment for teaching based on their years of experience. It was also revealed that there was no significant difference between male and female lecturers' perception towards the utilization of Cloud Base Learning for teaching. This finding agree with the finding of Yuan and Lee (2012) who investigated elementary school teachers' perceptions towards to the use of ICT. Magic Board, an interactive web-based environment which provides a set of virtual manipulatives for elementary mathematics, is used as the case of ICT and observed that teachers rated high scores on perceived teaching and learning assistance, and perceived competence of technology integration. The correlation among the three subscales indicates that teachers had a higher scores on one scale correlated with higher scores on the other two scales. Findings show no gender difference on perceptions towards Magic Board. However, teachers who have data projectors in their classrooms rated higher scores on perceived teaching assistance and perceived competence of technology integration than those without data projectors in their classrooms.

Similarly, the finding is in agreement with the finding of (Samson-Akpan *et al.,* 2016) who investigated nurse educators' perception of problem-based learning in order to provide useful information for necessary intervention and found out that most of the respondents 29(75.5%) were females. With regards to professional and educational qualifications, all the respondents were registered nurses and most of the respondents were B.N.Sc./BSc./B. Ed degree holders 16(40%), while Masters' Degree holders

were 15 (37.5%). The results revealed that majority of the respondents had a positive view and attitude towards problem-based learning and recommended it be introduced into nursing educational institutions. The study suggests that nurse educators will be positively disposed to the use of problem-based learning in teaching-learning process as it is being used in most professional courses in developed and developing countries. Therefore, it was suggested that all stakeholders in nursing educational institutions should organize workshops and seminars to orientate nursing educators on problem-based learning. The curriculum for training of student nurses should be reviewed to reflect problem-based learning.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Global trends in the application of cloud-based learning environment demonstrate that the power of ICTs can transform the several interconnected functions of universities. The ICTs offer the potentials to strengthen conventional education while rapidly transforming distance education. They do not only expand the research and development opportunities of the institutions but also strengthen libraries with access to an unlimited body of digital information globally and bring considerable efficiency and effectiveness to university management. Information and Communication Technologies (ICTs) offer innumerable benefits in enhancing the quality and quantity of learning in tertiary institutions. Despite the prevalent nature of ICT in virtually every aspect of human endeavours, they have not been widely integrated into the teaching and learning process in schools.

Based on these findings, it can be concluded that lecturers are aware of the existence of cloud-based learning for teaching based on their years of experience in Kebbi State. It could be concluded also that there is positive attitude of lecturers towards the utilization of cloud-based learning environment for teaching in Kebbi State and there is good perception on the utilization of cloud-based learning environment.

5.2 Recommendations

Based on the findings, the following are recommended.

1. Understand that utilizing cloud-based learning environment is just like adopting some form of outsourcing. Tertiary institution in Nigeria needs a properly framed outsourcing strategy to find the optimal balance between

"do it yourself" and "hired hand" to truly leverage the cloud-based learning environment.

2. Identify the type of cloud-based learning environment that suits best for campus needs. Private clouds can be operated by the institution itself or by a third party, and hosted on campus or off-site. Community clouds have wider reach as it can be shared by several organizations. Public clouds are owned by a third-party cloud provider and made available to the institute.
3. Identify the opportunities and benefits associated with the migrating from traditional existing computing arrangements to cloud-based services. For example, migrating reduces server, licensing costs, and infrastructures requirements, while giving campus users the flexibility to access their applications and data from anywhere.
4. Prepare the institutions network for cloud-based learning environment. The network has a critical role in making the cloud secure and delivers the expected performance.
5. Strengthen the institutions' integration skills. Develop a centre of excellence for integration to ensure a flexible infrastructure.
6. Tertiary institutions across the country should provide cloud-based learning environment to support the traditional face-to-face teaching and learning process.
7. National University Commission, National Commission for Colleges of Education and National Board for Technical Education should provide high level supervision in ensuring that tertiary institutions across the country utilized cloud-based learning environment.

5.3 Contributions to Knowledge

1. This study has shown that lecturers are aware of cloud-based learning environment and they have positive attitudes towards the utilization of cloud-based learning environment.
2. The findings in this study showed that lecturers have good perception towards utilization of cloud-based learning environment for teaching and learning process in tertiary institutions in Kebbi State.
3. The findings from this study have added to knowledge in the sense that it can serve as a source of literature for researchers as a foundation for further research by students, policy makers, curriculum planers, government and researchers.

5.4 Suggestions for Further Study

The following suggestions have been made for further studies:

1. This study was limited to Kebbi State, further studies could be conducted in North-Central to make room for generalization.
2. This study only examines the awareness, attitude and perception of lecturers, further studies could focus on readiness and willingness of lecturers and students on the use of cloud-based learning.

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APPENDIX A

QUESTIONNAIRE ON LECTURERS AWARENESS, ATTITUDE AND PERCEPTION TOWARDS THE UTILIZATION OF CLOUD BASE LEARNING ENVIRONMENT.

Dear Respondent,

This questionnaire is designed to arouse your responses on the above subject matter. Any statistics given will be used strictly for the purpose of this study and will be dealt with utmost confidentiality.

Cloud Computing refers to internet software service, hardware, servers in data center which runs software, hardware, and computer services. It needs high reliability, and autonomy to support accessibility everywhere (Lohmosavi et al., 2013). Cloud Base Learning Environment (CBLE) is an e-learning applications on a cloud and following its virtualization features of the hardware, it reduces the construction and maintenance cost of the learning resources.

SECTION A: Respondent's Bio-Data

Name of Institution.....

Gender: ☐ ☐

Male Female

Years of Experience: ☐ ☐ ☐

1-5 years 6-10 years 11 and above

INSTRUCTION: Indicate your choice of options in all sections by ticking (√)

SECTION B:

Lecturers' level Awareness on the Usage of CBLEs

Note: Fully Aware (FA); Aware (A); Undecided (U) Not Fully Aware (NF); Not Aware (A)

S/No	Items	FA (5)	A (4)	U (3)	NFA (2)	NA (1)
I am aware that: Cloud Base Learning Environment (CBLE)						
1	CBLE is not in existence.					
2	CBLE are readily available for use.					
3	CBLE provide quality free platform for teaching.					
4	CBLE can be used to provide instructional materials.					
5	CBLE could not be used to compliment normal classroom teaching and learning					
6	CBLE can be freely shared.					
7	CBLE can provide feedback to teaching and learning activities					
8	CBLE could enhance innovation among lecturers.					
9	CBLE encourage globalization of curriculum.					
10	CBLE utilization can advance openness and sharing of intellectual property.					

SECTION C: Lecturers' Attitudes towards CBLEs for Teaching

Note: SA (Strongly Agreed); A (Agreed); U (Undecided); D (Disagreed); SD (Strongly Disagreed)

S/No	Items	SA (5)	A (4)	U (3)	D (2)	SD (1)
1	Using CBLE services is not good					
2	The students can get a better learning outcome when they use CBLE services.					
3	Using my knowledge of ICT to access CBLE services is favorable.					
4	Using CBLE services for teaching and learning can be effective and efficient					
5	CBLE does not have positive influence on users.					
6	My using CBLE services for research is good.					
7	It is good to use CBLE services in the classroom.					
8	CBLE are available at reduced cost.					
9	Using cloud services in teaching is worth extra effort.					
10	CBLE can be used in other disciplines in the institution.					

SECTION D: Lecturers' Perception towards the Utilization of CBLEs for Teaching

Note: SA (Strongly Agree); A (Agree); U (Undecided); D (Disagree); SD (Strongly Disagree)

S/No	Items	SA (5)	A (4)	U (3)	D (2)	SD (1)
I perceive that CBLE:						
1	Will not be useful in teaching and learning activities.					
2	Will provide supplementary teaching and learning materials					
3	Can be of great advantages to teaching pedagogy.					
4	Will reduce the cost of other e-learning platforms.					
5	Can increase educational opportunities for lecturers and students who cannot be in the classroom.					
6	Will serve as global interactive platform for lecturers.					
7	Will assist institutions to have quality materials					
8	Can provides ability to access global academic curriculum at a detailed level.					
9	Will give me opportunity to research on new development in my area of specialization.					
10	Can be of questionable quality					

Thank you.

AJIBOYE Mayowa Adelayo.
M.Tech/SSTE/2017/6914