AN ASSESSMENT OF SECONDARY SCHOOL TEACHERS' ATTITUDE, COMPETENCES, AND ACCESS ON THE UTILIZATION OF INFORMATION AND COMMUNICATION TECHNOLOGY IN TEACHING IN KANO AND JIGAWA STATES

BY

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APPROVAL PAGE

This Dissertation has been read and approved as meeting the partial requirements for the award of Doctor of Philosophy (Ph.D) in Curriculum Studies, by the School of Postgraduate Studies, Bayero University, Kano

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CERTIFICATION

I hereby certify that the work in this dissertation entitled: A Assessment of Secondary School Teachers' Attitude, Competence and Access on the Utilization of Information and Communication Technology in Teaching in Kano and Jigawa States has been carried out by me in the Department of Education, Bayero University, Kano. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this dissertation was previously presented for another degree or diploma at this or any other institution.

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DEDICATION

I dedicate this work to my late Mother Khadijat Umaru Kokau and urge all those who come across this work to pray for her soul to rest in eternal peace. May JannatulFirdaus be her final resting place.

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Operational Definition of Terms

ICT: Any computer- based communication technologies networked or stand-alone, hardware or software that can be used as teaching, learning and information r esources.

Attitude: The degree of favour or disfavor towards the existence of information and communication technology (ICT) in schools.

ICT Competence: The reported ability to use ICT as measured by the items in the research survey.

Abstract

This study investigated senior secondary school teachers' attitudes, competencies and access on the utilization of information and communication Technology in teaching in Kano and Jigawa States, Nigeria. It explored the relationship between teachers' attitudes to ICT and three independent variables: Computer Attributes, ICT Competencies and Computer Access. The population of this study comprised seven thousand five hundred and twenty five (7525) teachers from three hundred and fifty two senior secondary schools in the States. A descriptive survey design was used with 386 teachers drawn from 35 secondary schools from Kano and Jigawa States - Nigeria, using proposionate sampling technique. An adapted questionnaire from a study of Albirini (2005) titled "teachers' attitudes to information and communication technology" was used. The instrument contained four sections, each of which represented one of variables examined in the research. These sections were leveled (1) Teacher's attitude towards ICT, (2) Perceived computer attributes scale, (3) Perceived computer competence scale, and (4) Perceived computer access scale. Although the instrument had been validated by Albirini, it was however, revalidated by this researcher using test retest method within two weeks interval. Pearson Product Moment Correlation Coefficient (PPMC) test resulted in 0.92, 0.87, 0.81, and 0.94, for section 2, 3, 4, 5 respectively. Seven research questions and three hypotheses were drawn to guide the study. A data analysis was done using frequency, percentage, mean scores, and standard deviation to answer research questions 1-4. PPMC was used to test three hypothesis and established relationship between and among variables. Results indicated passive teachers' attitudes toward the use of ICT teaching, low ICT competencies among senior secondary teachers, as well as low access to ICT facilities by teachers in the States. Results of the PPMC indicated a positive correlation between teachers attitude toward the use of ICT in teaching and computer attributes, negative correlation between teachers ICT competencies and teachers attitude toward utilization of ICT in teaching, significant relationship between teachers access to ICT facilities and teachers competencies in the utilization of ICT in teaching. Based on the findings, it was recommended that, adequate provision of computers should be made in all secondary schools in the States so as to increase access and competencies of teacher. In service, seminars, workshops, train- the- trainers programme for the use of ICT should be organized for secondary school teachers in the States. Also, it is recommended that further studies should be done on ICT generally by using a modified instrument of this research.

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Background to the Study:

The field of education has certainly been affected by the penetrating influence of Information and Communication Technology (ICT) worldwide and in particular developed countries. ICT has made a very profound and remarkable impact on the quality and quantity of teaching, learning and research in educational institutions. Information and Communication Technology has the potential to accelerate, enrich, and deepen skills of teachers, to motivate and engage students in learning, to help relate school experiences to work practice, to help create economic viability for tomorrows teachers; contribute to radical changes in school; to strengthen teaching and to provide opportunity for connections between the school and the World (Ajayi, Ekundayo & Haastrup, 2009).

Today Information and Communication Technology plays a vital role in teaching learning and research. It is assumed that tertiary education students feel more dependent on the internet for their class assignment and the latest information in their subject areas than conventional resources of information such as textbooks, journals, periodical, etc. Teachers also feel a bit handicapped in updating their knowledge base quickly without using Information and Communication Technology devices such as the internet, (Yusuf: 2005).

Twenty first century education reform policies have been focused on a shift from the traditional teacher centered pedagogy to more learner-centered methods (Global Alliance for ICT and Development, 2009). Teaching and learning has gone beyond the

teacher standing in front of a group of pupils/students and disseminating information to them without the students' adequate participation. (Ajayi, 2008). Ajayi, Ekundayo, & Haastrup (2009) posited that with the aid of ICT, teachers can take students beyond traditional limits, ensure their adequate participations in teaching and learning process and create vital environments to experiment and explore. This new development is a strong indication that the era of teachers without ICT skills are gone. Any classroom teacher with adequate and professional skills in ICT utilization will definitely have his students perform better in classroom learning. In the same vein, Ololube (2005) posited that teachers need to learn how to integrate ICTs into classroom activities and school structure. The quality of teachers is known in virtually all countries to be the key predictor of student learning.

Teachers play invaluable roles in the development of the education system of a country, hence the saying that "no nation can rise above the quality of its teachers" is true. The knowledge and utilization of ICT for the purpose of teaching and learning, capacity building, research and other duties related to teaching and learning cannot be underestimated.

In consonance with this, Nigerian government has promise to provide teachers with intellectual and professional background adequate for their assignment and make them adaptable to any changing situation (FRN, 2004). Such changes calls for a response to the new technological advancement, for enhance opportunities and for better teaching: hence; its radical implication on the traditional teaching and learning paradigm. Thus for teachers there are myriad of ICT to navigate which have been found to be very efficacious in their position as learning facilitators and counselors of students.

It was hoped that teachers' use of technology in education would improve educational outcomes, increase technological skills and reduce anxiety when preparing lessons. Technology usage is an important indicator of their preparedness to carry out the obligations of daily lessons. In fact, Woodrow (1992) asserts that any successful transformation in educational practice requires the development of positive user attitude toward new technology. The development of teachers' positive attitudes toward ICT is very significant factor not only for increasing computer integration but also for avoiding teachers' resistance to ICT use (Watson, 1998).

Developing countries are generally characterized by a rapidly growing young population. Literacy levels are also low combined with high drop-out rates in schools. The cost of education is often too-high for children to continue with their studies after a certain point. Yet, governments give low priority to education which has resulted in limited educational facilities and a shortage of qualified teachers in most developing countries. However, in order to participate in the global economy and ensure sustainable national development, developing countries need to develop a vibrant education system.

In 2000, the international development community adopted the Millennium Development Goals (MDGs) that aim to eliminate global poverty, hunger and inequality by 2015. Education receives special attention in MDGs, which focuses on enhancing education in terms of quality and access. It is within this context that IICD has been involved in integrating ICTs in the educational sectors of eight countries (of which Nigeria is among) through 32 projects over the past ten years. IICD operate through partnerships. Partnerships with international organisations, governmental agencies, ministries, schools, teachers, civic society organisations and private sector. IICD has worked closely with

these partners to develop and implement a broad range of educational projects that use ICTs to achieve the following

- Enhance the quality of teachers and instructions
- Improve the learning process by provision of more interactive educational materials
- Improve school management and administration
- Improve young people learning skills
- Develop a critical mass of knowledge workers
- Provide access to ICTs in schools.

Ministries of Education in the Two States have made huge investments in ICT in the hope of attaining the goals of improving the quality of education through enriching the learning environment with educational software and technologies (Kano Teachers Digest, 2013. MOE, Jigawa State, 2011). Presently all Senior Secondary Schools in the States have been provided with Computer laboratories equipped with Computers, Printers, Instructional software , Video players, Overhead projectors and Television set. In case of Jigawa State all senior boarding Secondary Schools were connected with the Internet (MOE, Jigawa State 2011).

Teacher's needs to have positive attitudes, competencies, and access to effectively and efficiently utilize it in teaching. Teachers' attitudes toward ICT is not sufficient precondition for successful implementation of ICT in teaching; rather the tools and facilities must be made readily available to both the teachers and students in addition to the fact that they must have competences in it's utilization.

Experience has shown that the secondary schools in the two states indicate that many teachers in the system still rely much on the traditional “chalk talk” method of teaching rather than embracing the use of ICT. This is an indication that the teachers’ are still lagging behind in the trend of changes in the country and the rest of the world. This presupposes that teachers attitudes, competences and access to ICT may be low or lagging behind in the utilization of ICT. It is against this background that, this study investigated teachers’ attitudes, competences and access on the utilization of ICT in teaching in Kano and Jigawa States.

1.2 Statement of the Problem

The introduction and use of Information and Communication Technology in teaching has been justified by its proponents for its potential to provide cost effective and flexible teaching and learning for a diverse student population. In spite of the belief of policy makers worldwide that ICT is essential to improving the quality of life for individuals in developing countries such as Nigeria, research suggests that many factors play a part in effective integrating ICT into economic and educational systems (Yusuf, 2005; Olumirin, 2008). In school settings in developing countries, where teachers effectively function as “change agents” (Abdullahi, 2011) many factors play significant role in the extent to which teachers carry out the responsibility of utilizing technology for instructional purposes.

Issues about the place and purpose of information and communication technologies in education are being surfaced and investigated by various commentators and researchers. Differing opinions seem to arise in understandings and possibilities surrounding teachers’ use of ICT in teaching. While several studies have addressed the relationship between

teachers attitudes and effective use of ICT in the classroom (Albirini, 2005; Samak, 2006; Cartson, 1994; Woodrow, 1992; Hardy, 1998; Koohang, 1987; Yusuf, 2005; Teo, 2008; Gilakjani & Leong,2012), many of such researches indicated a significantly positive correlation holds between teachers' attitudes towards computers and their tendency to utilize them in the classroom. Several studies (Razak & Eswaran, 2010; Al-Zaidiyeen, Mei, & Fork, 2010; Park, & Son, 2009; Deniz, 2007), illustrate cases in which low levels of computer integration are observed in teachers with considerably positive computer attitudes. One can ascribe the inconsistency between highly positive attitudes and low computer utilization in the classroom to a bunch of constraints including computer competences (Ubulum, Enyekit, Onuekwa,& Amaehule, 2011; Andoh, 2012, Ajayi, 2008), and access to ICT facilities (Plomp, Anderson, Law,& Quale, 2009; Yildrim, 2007). It must however, be noted that few researches have investigated this phenomenon in Nigeria, and fewer if ever still looked at teachers' attitudes, competenies and access to ICT in Kano and Jigawa States. Since little research has explored the teachers' attitudes, competences, and access on the utilization of ICT in the States, it was assumed that this current research would fill an immediate need in the States in particular and the Country in general.

1.3. Objectives of the Study

This research study was designed to achieve the following objectives;-

1. To find out the attitudes of Senior Secondary School teachers toward the use of Information and Communication Technology (ICT) in teaching.

2. To find out the extent to which Computer attributes affect the attitudes of Senior Secondary School teachers toward the use of Information and Communication Technology (ICT) in teaching,

3. To find out the competences of Senior Secondary School teachers toward the utilization of Information and Communication Technology (ICT) in teaching.

4. To find out the extent to which teachers have access to Information and Communication Technology (ICT) facilities in Kano and Jigawa States.

5. To find out the relationship between computer attributes and the attitudes of senior secondary school teachers toward the utilization of Information and Communication Technology (ICT) in teaching in Kano and Jigawa States.

6. To find out the relationship between teachers' competences in the utilization of ICT and their attitudes toward it in Kano and Jigawa States.

7. To find out the relationship between teachers' access to ICT and their competences in the utilization of ICT in teaching in Kano and Jigawa States.

1.4 Research Questions:

The following questions were raised in order to guide the conduct of this study.

1. What are the attitudes of Senior Secondary School teachers toward the use of Information and Communication Technology (ICT) in teaching in Kano and Jigawa States?

2. What are the impact of ICT attributes on the attitudes of Senior Secondary School teachers toward the utilization of Information and Communication Technology (ICT) in teaching in Kano and Jigawa States?

3. What are the competences of senior secondary school teachers in the utilization of Information and Communication Technology (ICT) in teaching in Kano and Jigawa States?

4. To what extent does senior secondary school teachers have access to Information and Communication Technology (ICT) facilities in Kano and Jigawa States?

5. Is there any relationship between ICT attributes and teachers' attitudes toward the utilization of ICT in teaching in Kano and Jigawa States?

6. Is there any relationship between teachers' competences in the utilization of ICT and their attitudes toward the use of ICT in teaching in Kano and Jigawa States?

7. Is there any relationship between teachers' access to ICT facilities and their competencies in the utilization of ICT in teaching in Kano and Jigawa States?

1.5 Research hypotheses

The following null hypothesis were formulated and tested at 0.05 level of significance

1. There is no significant relationship between ICT attributes and teachers' attitudes toward the use of Information and Communication Technology in teaching.

2. There is no significant relationship between teachers' competences in the utilization of ICT in teaching and their attitudes toward the use of ICT in teaching.

3. There is no significant relationship between teachers' access to ICT facilities and their competences in the utilization of ICT in teaching.

1.6 Significance of the Study

This study is relevant to the Government, School authorities, teachers' Students and researchers. Significantly, this study may create awareness to teachers who are ignorant of the capability of ICT in assisting to ease teaching and learning. Also, teachers may have positive attitude to the use of ICT for the opportunity to assess various information since ICT is a tool with special link for information and communication processes and product.

The result of this study could assist government to identify educational programs that require ICT usage for effective productivity by harnessing the opportunity available to update their knowledge. Also, it may assist them preplan and include aspect that can ease the process of teaching and learning.

The finding of the study could also help the government to update and make provision for ICT facilities and materials for effective utilization. In addition, it may assist in the development of special facilities such as computer, Internet, Multimedia Projector, Interactive Radio, Dictating Machine, and other educational programs that could be used to ease teaching, learning and research.

The outcome of this research could also help the school authorities to create room for in-service and capacity building and training for teachers on ICT. The study may also provide sound basis for the development ICT skills for pre-service teachers. Furthermore, the need for relevant induction for newly recruited teachers in the use of Information and

Communication Technology (ICT) will be highlighted for improvement. In line with the objectives stated in the FRN (2004) and the underline needs specified in the FRN (2004) ICT has become an issue that must be considered when planning any educational programme at any levels. The finding of this study could eventually be source of reference for all stakeholders in the area of educational processes and product for planning befitting educational programme for the nation. This could enable the country to fit into the realms of the developed nations in the nearest future.

Significantly, this study will reveal the extent to which ICT facilities are provided in the schools which may help the government through the states ministries of education to make adequate provision for Information and Communication Technology facilities for successful teaching and learning.

The outcome or findings of the study could also help the government in updating teachers' knowledge and skills, more especially as it affects the utilization of Information and Communication Technology.

The results of the study would also be beneficial to teachers by creating awareness as to the importance of the use of ICT facilities in teaching and learning as it eases their work and increase their productivity. It may also assist them to preplan and include aspects that can ease the process of teaching and learning.

The findings of the study can assist curriculum planners and designers of teacher education to understand the need or necessity of integrating Information and Communication Technology into the mainstream teacher training in Nigeria.

The study may provide academician with reference materials as regard to the availability, teachers' skills and utilization of ICT facilities in teaching in secondary schools in the states.

Researchers can also benefits from the study by means of accessing empirical data or evidence in their quest for further studies in the integration of ICT in teaching in Nigerian Secondary Schools.

1.7 Scope and Delimitation of the Study

The scope of this study centred on secondary school teachers' attitude, competence and access on the utilization of ICT materials in the teaching and learning process in Kano and Jigawa States.

The study therefore, delimited to other schools such as Federal Government Colleges, Unity schools and Private Schools. Provision and availability of ICT materials were also delimited from the Study

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter entails discussions about the concepts, researches or empirical studies on teachers' attitudes, competences and access to Information and Communication Technology (ICT) towards it's utilization in teaching. Effort was made to trace the triple variables under study upon which they affect and influence the utilization of ICT in teaching learning situation as assumptions or principles as several empirical studies conducted using these individual assumptions were reviewed.

2.2 The Concept of Information and Communication Technology (ICT)

The term Information and Communication Technologies (ICTs) have been described differently by different scholars and writers in the Education and other sectors of the economy. These attest to the dynamic nature of the concept and its' applicability to almost all fields of human endeavours. It has been described as the collection, storage, processing, disseminating and use of information (Ezekoka; 2008). Siray-Batch ford (2009) sees ICT as "anything which allows us to get information to communicate with each other or to have an effect on the environments using electronic or digital equipment". Batch ford conception of ITC is wide in scope as it seen not only as communication devices but to include anything electronic or digital that can affect the environment.

ICTs include Telecommunication services such as Telephone, Mobile phone, Fax, Internet, Emails, Internet and other devices that give access to sources of Knowledge. Ofodu (2007) also refer to ICTs as electronic or computerized devices, assisted by human and interactive materials that can be used for wide range of teaching and learning as well as for personal use of information as an essential resource for individual growth and survival as well as a must for teaching and learning. An informed mind is a rich mind, is an enriched mind and if one is not informed, he will be deformed. Every person needs some form of information for his/her day to day existence and well – being. This is why Muhammad (1998) posited that there is no doubt in the fact that information is a vital tool for socio-political, economic, cultural (and Educational) development. Its provision in any society for that matter must be based on predetermined technique of collection, acquisition and organization as a function of the identified needs of the audience, choice of the most appropriate medium of communication. This signifies teaching and learning.

Byerly and Brodie (1999) in support of this assertion rightly opined that information is a vital element for creativity and innovation; a basic resource for learning and human thought; a Key to achieve a better result in their academic lives, and important resources for national socio-economic development. Information and Communication Technology (ICT) is a general term used to describe a range of technologies for collecting, storing, retrieving, processing, analyzing and transmitting information. As defined by Oliver et al (2000) “Is the technology which supports activities involving the creation, storage, Manipulation and communication of information (Principally computing, electronics and electronic communications) together with their related methods, management and applications”.

Such an all-embracing term is open to a number of interpretations depending on which context it is used. In some context, the term ICT means computers ancillary equipment's, software and firm wire (Hard ware) and similar procedures, services (Including support services) and related resources. ICT also includes any equipment or interconnected system or sub-system of equipment that is used in the automatic acquisition, storage, manipulation, transmission or reception of data or information.

From these definitions, ICT would therefore be defined as processing and sharing of information using all kind of electronic devices, an Umbrella that includes all technologies for the manipulation and communication of information.

There are six approaches to IT and ICT in Education that are often discussed.

- IT and ICT in the form of lesson Units or workshops for teachers and students.
- IT and ICT as a means of information storage and retrieval and a method of doing research.
- IT and ICT as the channel for delivering instruction.
- IT and ICT as the channel of assessing students' achievement. And providing prompt and efficient feedback for students.
- IT and ICT for storing and retrieving students' data and records.
- IT and ICT as a means of providing efficient and effective school administration.

There is no discussion of the content in these approaches. The influence IT and ICT can have on teaching methods depends on the Knowledge and skills of the teachers

and students and the implementation of IT and ICT in courses (Keysha 2006). The effect of IT and ICT varies across disciplines. Medicine has been more affected than History, for example. Regardless of the discipline, however, the advantage is that students and teachers are not limited by time and place (Fattaham 2004).

2.3 History of Information and Communication Technologies (ICTs)

Information Technology has been around for some time. Basically as long as people have been around because there were always ways of communication through technology available at that point in time. There are 4 main ages that divide up the history of information technology. Only the last age (electronic) and some electromechanical age really affects us today, but it is important to learn about how we got to the point we are at with technology today (Brady & Eikner, 2011).

Pre-mechanical:

Pre-mechanical age this is the earliest age of information technology. It can be defined as the time between 3000BC and 1450AD when human first started communicating. They would try to use language or simple picture drawings known as petroglyths which were usually carved in rock. Early alphabets were developed such as the Phoenicial alphabet. As alphabets became more popular and more people were writing information down, pens and paper began to be developed. It started off as just marks in wet clay. But later paper was created out of papyrus plant. The most popular kind of paper made was probably by the Chinese who made paper from rags. Now that people were writing or lot of information down they needed ways to keep it all in a permanent storage. This is where the first books and libraries are developed. Egyptian

scrolls which were popular ways of writing down information. Some groups of people were actually binding paper together into a book like form.

Also during this period were the first numbering systems. Around 100AD was when the first 1-9 system was created by people from India. However, it wasn't until 875AD (775 years later) that the number O was invented. And yet now that numbers were created; people wanted stuff to do with them so they created calculators. A calculator was the very first sign of an information processor. The popular model of that time was the abacus.

Mechanical:

Mechanical age is when people started to see connections between our current technology and its ancestors. The mechanical age can be defined as the time between 1450 and 1840. A lot of new technologies are developed in this era as there is a large explosion in interest in this area. Technologies like the slide rule (an analog computer used for multiplying and dividing) were invented. Blaise Pascal invented the Pascaline which was a very popular mechanical computer. Charles Babbage developed the difference engine which tabulated polynomial equations using the method of finite differences.

There were lots of different machines created during this era and while we have not yet gotten to machine that can do more than one type of calculation in one like our modern day calculators, we are still learning about how all of our all-in-one machine started.

Also; a look at the size of the machines invented in this time compared to the power behind them it seems (to us) absolutely ridiculous to understand why anybody would want to use them; but to the people living in that time ALL of these inventions were huge.

Electromechanical:

The electromechanical age can be defined as the time between 1840's to 1940"s. These are the beginnings of telecommunication. The telegraph was created in the early 1800s. Morse code was created by Samuel Morse in 1835. The telephone (one of the most popular forms of communication ever) was created by Alexander Graham Bill in 1876. The first radio developed by Guglielmo Marconi in 1876. All of these were extremely crucial emerging technologies that led to the advances in the information technology field.

Electronic Age:

Electronic age is what people currently live in. it can be defined as the time between 1940 and right now. The ENIAC was the first high-speed, digital computer capable of being reprogrammed to solve a full range of computing problems.

The evolution of ICT date back to 1823 when Charles Babbage; a professor of mathematics invented the Analytical Engine. The design comprised of four components for performing the basic functions of input, output, processing and storage ((Ubulum, Enyekit, Onuekwa & Amaehule, 2011).

2.4 Teachers Attitudes to Information and Communication Technology (ICT) in Teaching

Attitudes refer to one's perception of an object favorably or unfavorably. Attitudes represent mental evaluations about an object based on one's proximity or distance of it (Panagiotis, George, Nikos & Ioannis, 2005). Teacher attitudes towards computers then stand for teachers' evaluation and perceptions of self-regarding, how they feel about utilizing computers in their own teaching practices. Addressing teacher attitudes is essential because teachers take on a major role in deciding on the extent to which computer use is allowed or hindered in the classroom. Teo (2008) contends that teachers hold a sound potential to pass their own beliefs on students, and thus, their attitudes towards computers may in one way or other determine students' future computer use. That is why Teo (2008) lays extensive emphasis on studying teacher attitudes towards ICTs. Furthermore, Gilakjani & Leong (2012) concur that if any success is to be expected from integrating computers into the classroom, it is a must that negative teacher attitudes be identified and refined as well as fostering the positive ones.

However, it is unfortunate to note that very few studies (Albirini, 2006; Egbert, Paulus & Nakamichi, 2002) have addressed teacher attitudes towards computer use. This, Sahin-Kizil (2011) argues, may account for the low level of achievement in computer integration despite the remarkable investments made into it in terms of money, time and effort. Much research (Kim, 2002; Teo, 2006), however, indicate that a significantly positive correlation holds between teachers' attitudes towards computers and their tendency to utilize them in the classroom. In other words, the more positive attitudes teachers have towards computers, the more likely they are to use computers in the

classroom. In a study drilling into users' perceptions about computers and World Wide Web, Liaw (2002) purports that the success of computer use heavily depends on positive user attitudes towards it. Similarly, Kim (2002) reiterates that teachers' attitudes significantly influence their use of computers in the classroom. Nevertheless, previous studies report several factors affecting teachers' attitudes towards computers. Several studies (Egbert, et.al. 2002; Yildirim, 2000) reveal that teachers' participation in training programs and the extent to which they transfer their knowledge into their classroom strongly correlate with their attitudes towards computers. Likewise, much research (Liaw, 2002) highlights that the teacher's personal experience with computers is a significant predictor of his/her attitudes. Furthermore, several studies (Deniz, 2007; Yuen & Ma, 2001) indicate that teachers' computer competence plays a key role in developing positive attitudes towards computers. On the other hand, Yildirim (2000) posits that computer anxiety and liking significantly affect teacher attitudes. That is teachers with low levels of computer anxiety and high levels of computer liking are identified with more positive attitudes.

Also, many researchers (Teo, Luan, & Sing, 2008) maintain that perceived ease of use and usefulness are crucial factors affecting teachers' attitudes towards computers. Besides, Gilakjani & Leong (2012) stress that whether computer programs to be used are appropriately suited to teachers' own needs and their students' needs plays a major role in teachers' attitudes towards using them. Still, one should notice that merely positive attitudes on the part of teachers can in no way ensure enhanced use of computers in the classroom. Several studies (Razak & Eswaran, 2010) illustrate cases in which low levels of computer integration are observed in teachers with considerably positive computer

attitudes. In a study of this sort, Al-Zaidiyeen, Mei & Fook (2010) propose that their participants make minimal use of computers despite reporting highly positive attitudes. One can ascribe the inconsistency between highly positive attitudes and low computer utilization in the classroom to a bunch of constraints including lack of time (Park, & Son, 2009), administrative and curricular restrictions (Egbert, et.al. 2002) insufficient numbers of computers (Razak & Eswaran, 2010; Deniz, 2007), lack of materials appropriated to computer use (Lam, 2000).As for the teacher characteristics, major of study (Liaw, 2002), age (Sahin-Kizil, 2011) and gender (North, & Noyes, 2002) are frequently reported to have an impact on teacher attitudes. However, recent findings on the relationship between gender and computer attitudes have made the proposition of previous research redundant. Although earlier research (Kadijevich, 2000) suggested that males had more positive attitudes towards computers, more recent studies (Ayres, 2002) have revealed that the difference in computer attitudes stemming from gender is disappearing. Teo (2006) concludes that the more widespread use of computers by almost every member of the society has made the differences.

Attitude can be classified as effect, cognition or behavior. These attributes according to Zimbardo and Ebbession (1970) consist of an individual's evaluation of liking or an emotional reaction to human or non – human. The individual beliefs and factual knowledge is dealt with by cognition while the behaviour aspects involves the overt behaviour of an individual who has no knowledge of certain attributes in human or knowledge of a particular features and functions of a non-human may not likely to be able to generate any attitude toward them.

From another dimension, attitudes, according to Byrad and Koohung (1989) reflect the perceptive stand of an individual. It entails an individual's understanding of a concept and subsequent response to it. This may be according to his/her inner will and belief. Also, Rosenberg, Holland, McGuire, Abelson, and Brehirn (1997) Opined that attitude are predispositions meant to respond to in a particular way toward a specific class of Objects, in this context may include those that are functional and non – functional. Due to the fact that attitudes are pre-dispositions, they are not directly observable and neither can they be measured by assigning numerical values. However, inference can be drawn from the way an individual respond or re-act to stimuli in order to determine what attitude of that person is to a given phenomenon. ICTs have great potential for knowledge dissemination, effective learning and the development of more efficient Educational services.

Moreover, the Adoption of ICT by Education has been seen as a powerful way to contribute to Educational change, better prepare students for information age; improve teaching, learning outcome and competencies of learners, and equip students with survival skills for the information society. Therefore teachers are expected to integrate ICT into their teaching and learning processes.

To successfully, initiated and implement ICT in the School program depends strongly on teachers' support and attitudes. It is believed that if teachers perceived ICT as neither fulfilling their own needs nor their students' needs; it is likely that they will not integrate the technology into teaching and learning. Evidence suggests that teachers attitudes and beliefs influence successful integration of ICT into teaching (Hew, & Brush; 2007, Keengwe and Onchavaric, 2008). If teachers' attitudes are positive toward the use

of ICT, then they can easily provide useful insights about the adoption and integration of ICT into teaching and learning processes.

Some researchers study the relationship between teachers' perceptions of the use of ICT and their actual integration into teaching and learning processes towards the use of ICT in classrooms. An observation method was used to collect data on teachers' beliefs and attitudes. The study revealed that there was inconsistency between teachers' beliefs and their actual use of Technology in the Classroom. Teachers' beliefs and Teaching Practices were found not to match. Similarly, Simonson (2004) used a quantitative study to explore the beliefs of Primary School teachers on the use of ICT in teaching. The result revealed that teachers' beliefs and attitudes were related to their use of Technology. Also, Drent and Meelissen (2008) conducted a survey about factors which influence innovative use of ICT by teachers Educators in the Netherlands. A sample of 210 teachers was used for the study. Their study revealed that student –oriented pedagogical approach; positive attitude towards Computer experience; and personal entrepreneurship of the teacher Educator have a direct positive influence on the innovative use of ICT by the teacher.

Research has shown that teachers' attitudes towards technology influence their acceptance of the usefulness of technology and its integration into teaching (Huang & Liaw; 2005). In E.U. Schoolnet (2010) survey on teachers' use of Acer, Net-books involving Six European Union countries a large number of participants believed that the use of net-book had positive impact on learning, promoted individualized learning and helped to lengthen study beyond School day. However, evidence suggests that small number of teachers believe that the benefits of ICT are not clearly seen. The empirical survey revealed that one fifth of European Teachers believed that use of ICT in teaching

did not benefit their students learning (Korte & Husing; 2007). A survey of U.K Teachers also revealed that teachers positivity about possible contributions of ICT was moderated as they become rather more ambivalent and sometimes doubtful' about specific; current advantages' (Becta; 2008).

Research findings by Ajayi; Ekundayo and Haastrup (2009) revealed that ICT has the benefits of making teaching and learning interesting, helping the distance learning programme; help teachers to be up – to -date; enhancing quality of work by both teachers and students. Macot (2006) advanced that the degree to which teachers integrate ICT into their teaching is related to their personal knowledge and skills in using this technology.

Teachers are implored to adopt and integrate ICT into teaching and learning activities; but teachers' preparedness to integrate ICT into teaching determines the effectiveness of the technology and not by its sheer existence in the classroom (Jones, 2011). The attitudes of teachers toward technology greatly influenced their adoption and integration of ICT into their teaching. According to Russell and Bradley (1997), anxiety, lack of confidence, competence and fear often implies ICT takes a back seat to conventional learning mechanism Therefore, an understanding of personal characteristics that influence teachers' adoption and integration of ICT into teaching is relevant.

Several factors influencing the adoption and integration of ICT to teaching have been identified by researchers. Rogers (2003) identified five technological characteristics or attributes that influence the decision to adopt an innovation. Stockdill and Moreshouse (1992) also identified user characteristics, technological considerations, and organizational capacity as factors influencing ICT adoption and integration into teaching.

Various studies have shown the multifaceted problems militating against the effective use of ICT in teaching/learning process in schools. These include Ajayi, Ekundayo & Haastrup (2009) who examined the application of Information and Communication Technology (ICT) in Nigerian secondary Schools. The study investigated the level of availability of ICT facilities in schools; the capacity for using ICT facilities for teaching/learning, the perceived benefits of using ICT and the problems facing the use of ICT in secondary schools. Their finding show that Nigerian Secondary schools are lagging behind in the level of ICT application in teaching/ learning process; the capacity for using ICT by both teachers and students is also very low. Despite the perceived benefits in the use of ICT in school; there are a lot of factors inhibiting the successful application of ICT in secondary schools.

Similarly, Ubulum, Enyekit; Onuekwa and Amaehule (2011) investigated Information and Communication Technology (ICT) accessibility and utilization of teaching business studies in secondary schools in Rivers State. Their finding revealed that ICT facilities were not available, and accessed by teachers in secondary schools.

Also, in the area of teachers' skills and practices in teaching Buabeng-Andoh (2012) explored the teachers skills, perception and practices about ICT in Ghanaian second-cycle institutions. The finding revealed lack of ICT skills among teachers, lack of training with regards to the integration of ICT into teaching among others as barriers to teachers' application of the technology. ICT competence is defined as being able to handle a wide range of varying ICT applications for various purposes (Van Braak et al. 2004) According to Berner (2003), NA (1993(and Summers (1990) as cited by Bordbar

(2010), teachers' computer competence is a major predictor of integrating ICT in teaching.

Research has been conducted on teacher's self-efficacy and reported to have greater effect on their use of ICT. Self-efficacy is defined as a belief in one's own abilities to perform an action or activity necessary to achieve a goal task (Bandura, 1997). In real meaning, self-efficacy is the confidence that individual has in his/her ability to do things that he/she strives to do thus teachers' confidence refers to both to teachers perceives likelihood of success on using ICT for educational purposes and on how far the teacher perceives success as being within his or her control (Peralta & Costa, 2007).

2.5 Computer Attributes and their Effects on Teachers' Attitudes toward the Utilization of ICT in Teaching

Rogers (1995) contends that "the perceived attributes of an innovation are one important explanation of the rate of adoption of an innovation". Based on past research, Rogers (1995) identified five innovation attributes that may contribute to the adoption or acceptance of an innovation: relative advantage, compatibility, complexity, observability, and trialibility. According to Rogers (1995), *relative advantage* is the degree to which an innovation is perceived as better than the idea it supersedes.

Compatibility is the extent to which an innovation is perceived as consistent with the existing values, past experience, and needs of potential adopters. *Complexity* is the degree to which an innovation is perceived as relatively difficult to understand and use. *Observability* is the extent to which the results of an innovation are visible to others.

Finally, *trialibity* refers to the degree to which an innovation is experimented with on a limited basis (Rogers 1995;p 250-251).

However, Rogers (1995) cautions that "one problem with measuring the five attributes of innovations is that they may not in all cases be the five most important perceived characteristics for a particular set of respondents" (p.209). More simply stated, some computer attributes that are deemed important to one people might be irrelevant to peoples from other cultures. Based on Rogers' warning, the study will utilize only four computer attributes that are thought to be relevant to the participants in this study. These include relative advantage, compatibility, complexity and observability. Trialibility was excluded because the majority of Nigerian teachers may not have had the chance to experiment with computers before these were introduced into schools. That is, Trialibility does not seem to be pertinent computer attribute to the participants in this study.

Research has established a relationship between perceived innovation characteristics and adoption (Rogers & Shoemaker, 1971; Sooknanan, 2002). Rogers and Shoemaker (1971) found that relative advantage, compatibility and observability were positively related to adoption, whereas complexity was negatively correlated. In his study in Trinidad and Togo, Sooknanan (2002) used the same four computer attributes utilized in this study. He found that relative advantage, compatibility, and observability were significantly related to the adoption/ implementation variables. However, the results showed no relationship between complexity and the adoption/implementation variables.

Based on the above conclusions, Sooknanan (2002) emphasized the importance of computer characteristics to the adoption/implementation of computers in developing countries. Rogers (1995) proposes that "the relative advantage of an innovation, as perceived by members of a social system, is positively related to its rate of adoption" (p.250). Several studies have endorsed the positive relationship between teachers'

attitudes and the relative advantage of using computers (Sooknanan, 2002; Rogers and Shoemaker, 1971). Sooknanan (2002) found that "relative advantage" was the second most significant innovation characteristic in relation to teachers' attitudes. The Technology Acceptance Model proposed by Davis (1989) points to "usefulness" as the main innovation factor that determines individuals' attitudes and subsequent acceptance of technology. Teachers' and faculty's perceptions of the value of technology has been systematically reported as a predictor of their use of computers in the classroom (e.g, Berner 2003; Hendricks, 1998; Huang, 2003).According to Rogers (1995), "the perceived compatibility of an innovation is positively related to its rate of adoption" (p.250). Some studies have also established a positive relationship between attitudes and compatibility (Rogers and Shoemaker, 1971; Sooknanan, 2002). Generally, compatibility is viewed in terms of needs and beliefs (Rogers, 1995). Zaitman and Lin (1971, cited in Sooknanan, 2002) suggest that the less compatible an innovation and the more changes and adjustments it requires, the slower its acceptance. Sooknanan (2002) found that compatibility was the most significant innovation attributes in relation to computer attitudes. Teachers in his study had positive perceptions of the compatibility of computers to their curriculum goals. In addition, teachers perceive that "computers are reliable and accurate, and meet their information needs" (129). However, Ridgeway and Passey (1995) found that teachers were uneasy about the change that computers may bring into their teaching practices. Teacher felt threatened by computers, as they contest their values and roles.

Complexity, as discussed in the research, suggests that the greater the perceived complexity of an innovation, the less will be its rate of adoption (Rogers, 1995). In his

Technology Acceptance Model, Davis (1989) suggests that "ease of use" is the second most important innovation factor determining individuals' attitudes and subsequent acceptance of technology. Harper (1987) argues that, "To many teachers, a computer is intimidating and difficult to master, so they avoid the computer for fear of committing embarrassing mistakes" (p.47). Some researchers pointed to the complexity of computer integration as a "brake" on teachers' use of the new technology (Marsshall and Ruohonen, 1998; Ojo & Awuah, 1998).

In terms of observability, Rogers (1995) contends that "the perceived observability of an innovation is positively related to its rate of adoption" (251). Sooknanan (2002) found that observability was significantly related to the teachers' attitudes toward computers in Trinidad and Tobago education. Most of the teachers in his study had not heard about or seen computers at work, especially as an educational tool. Hebert and Benbasat (1994, cited in Sooknanan, 2002) found that observability contributed to attitudes and simultaneously predicted the intent to use information technology.

In general, the literature points to a positive relationship between teachers' attitudes toward ICT and their perceptions of computer attributes. Teachers who perceive computers as advantageous, compatible with their current practices, easy to use, and observable usually have positive attitudes toward ICT in education.

2.6 Computer Competencies and the Utilization of Information and Communication Technology in Teaching and Learning Situation:

Competencies are the state of possessing adequate knowledge for the performance of a duty. It is the power to produce a desired result (Dictionary Com. Cambridge Dictionaries). A competence is also the quality of doing something well with no waste of time, money, or energy. Teacher ICT skill, is therefore, the ability of the teacher to perform his teaching task with adequate knowledge of the subject matter and teaching methodologies and good preparation of lessons to produce desired change in the learners using ICT tools and equipment. Igun; (2005) rightly pointed out that teachers and effective teaching cannot do without ICT in this era of communication Superhighway. The teachers and the Students must study, research, teach and communicate. With adequate and skilled knowledge on ICT, Nigerian teachers will be able to collaborate on the same level with their counterpart or collogues in the other parts of the World.

Aribisala (2006) posited that ICTs are increasingly playing an important role in teaching and school administration/organizations and in society is ability to produce, access, adopt and apply information. They are, however, being heralded as the tools for the post-industrial age and the foundations for a knowledge economy due to their ability to facilitate the transfer and acquisition of knowledge.

Information and Communication Technology can play a vital role in increasing access to education as well as providing better quality education. ICT is used worldwide to increase access to and improve the relevance and quality of education. The unprecedented speed and general availability of information due to ICT extend

educational opportunities to marginalized and vulnerable groups. ICT gives students and Teachers new tools with which to learn and teach.

The flooding of the market with newer communication media liberated curriculum planners, designers and implementers from emphasizing print and has equipped teachers, students and researchers with a wide variety of more easier and effective media that offer two-way communication to choose from. It is no longer necessary for teachers and students to be in the same space due to innovations of technologies such as teleconferencing and distance learning, which allow for synchronous learning. If given access and appropriate training in ICT (Igun, 2005). The internet can also provide these groups with an abundance of online learning materials, covering a wide range of subjects that are up-to-date and produced by cutting edge technologies. Thus teachers and learners are no longer solely dependent on physical media such as printed textbooks which are often time outdated, especially in the developing countries. With today technology; one even has the ability to access experts, Professional and leaders in the field around the World and at any given time. Its ability to transcend time and space allows learning to take place 24 hours a day, 7 days in a week thereby increasing access to education.

ICT can enable teachers transform their practices by providing them improved educational content and more effective teaching methods. Continuous teacher training in updating their methodologies is critical to effective education policy and practice to keep pace with the constant advancement of technology. Through online teaching resources and other interactive materials, teacher development can greatly be improved (Becta, 2008).

ICT can improve the learning process through the provision of more interactive educational materials that increase learner motivation and facilitate the acquisition of basic skill. As rightly observed by the Global Alliance for ICT and development videos, and computer software can offer a more challenging and engaging learning environment for students of all ages.

The pervasiveness of Information and Communication Technology has brought about rapid technological, social and economic transformations which eventually lead into a network society organized around ICT (Yusuf, 2005). ICT is an indispensable part of education as its application makes institutions more efficient and productive, thereby engendering a variety of tools to enhance and facilitate teachers' pedagogical activities. For instance, e-learning is becoming one of the most common means of using ICT to provide education to students both on and off campus by means of teaching offered via web-based system (Ajayi and Ekundayo, 2009).

Information and Communication Technology (ICT) has become, within a very short time one of the basic building blocks of modern society. Many countries, now regard understanding ICT and mastering the basic skills and concepts of ICT as part of the core of Education alongside reading, writing and numeric.

There is a distinction between possession of knowledge and the ability or competence to use such knowledge and skill for appropriate purposes. However, the skill or knowledge is a prerequisite for its appropriate utilization.

Several researchers have investigated the ICT skills of secondary School Teachers both in Nigeria and other countries of the world. For instance, Ajayi and Ekundayo

(2009) examined the application of information and communication Technology in Nigerian Secondary Schools in Ondo and Ekiti States. Their fInding revealed among others ICT facilities were lacking in schools and students and teachers were a little exposed to the use of ICT. Moreover, the study revealed the perceived benefits of using ICT in Schools which include making teaching – learning interesting; helping the distance learning programs, helping teachers to be up-to- date, enhancing quality of work of both the teachers and the students. However, despite these perceived benefits, the study also revealed some of the challenges facing ICT in secondary Schools: Irregular power supply; inadequate Computer literate teachers: high cost of purchasing computers in Schools; inadequate facilities to support full Application of ICT and lack of fund.

According to Ajayi (2008), the use of these facilities; involves various methods which include systematized feedback system computer – based operation/Network, Video conferencing, Internet world – wide web sides and computer assisted instruction. It must however be stressed that the effective use of the various method of the ICT in teaching learning depends on the availability of these facilities and teachers competence (skills) in using them. He is also of the view that there are no functional internet facilities in most of the Secondary Schools; which appears to hinder the extent of teachers' exposure to the use of ICT in teaching. Teachers as well as students appear not to be knowledgeable in the use of ICT because there appears not to be any official training for both the teachers and the students in the Schools (Ajayi, 2008).

Ubulum, Enyeket, Onuekwa, and Amaehule (2011) in their analysis of ICT Accessibility and Utilization in teaching of business studies in Secondary Schools in Andoni of Rivers state, Nigeria found that, there was a problem of Accessibility of ICT in

the schools indicated by the respondents. However, there is no significant different on gender utilization of ICT among males and females teachers.

In another study on teachers skills, perceptions, and practices about ICT in Secondary Schools in Ghana, Buabeng Andoh (2012), discovered a positive correlation between ICT use and teachers competence. Further teachers perceptions in terms of using ICT were found to be positive but not statistically significant. The study also revealed inverse correlation among ICT use, age, and teaching experience. The descriptive results indicated that teachers' knowledge in basic ICT Applications as well as integrating ICT into teaching and learning processes was low.

The reasons for low use of these ICT tools could be attributed to lack of access to equipment in Schools, lack of teachers training skills in the use of the equipment. This is in agreement with Ubulum, Enyekit, Onuekwa and Amaechule, (2011), Ajayi (2008), Ajayi and Exundayo (2009) found that lack of computer literacy among teachers lack of training with regards to integration of ICT into teaching and absence of a properly developed computer skills curriculum were barriers to teachers application of the ICTs technology (Howie, Muller, & Paterson 2005).

However, in another study on the evaluation of Information and Communication Technology (ICT) Knowledge and skills levels of western Australian Government School Teachers it was discovered that males, younger teachers with less teaching experience among Secondary School teachers have higher level of ICT skills. The finding by Buabeng-Andoh (2012) revealed inverse correlations between ICT use, age and teaching experience.

2.7 Accessibility to ICT Infrastructure and its Effect on Attitude and Competence

Access to ICT infrastructure and resources in schools is a necessary condition to the integration of ICT in education (Plomp, Anderson, Law, & Quale, 2009). Effective adoption and integration of ICT into teaching in schools depends mainly on the availability and accessibility of ICT resources such as hardware, software, etc. Obviously, if teachers cannot access ICT resources, then they will not use them. Therefore, access to computers, updated software and hardware are key elements to successful adoption and integration of technology. A study by Yildrim (2007) found that access to technological resources is one of the effective ways to teachers' pedagogical use of ICT in teaching. Furthermore a study of 814 faculty members in higher education in Turkey showed that majority of the respondents reported having access to computers and the internet. 82.5% and 81.2% of faculty members had access to computers and internet respectively (Usluel, Askar & Bas, 2008). Also a quantitative study was conducted by Albirini (2006) to collect evidence from high school English teachers' views on computer attributes, cultural perceptions, computer competence, computer access, and personal characteristics. The respondents of the study were 63 male sand 251female teachers. The result revealed that 57% of the respondents had computers at home and 33.4% had access to computers at school. This is an indication of teachers' inadequate access to computers. The National Centre for Education Statistics (2000 as cited in Afshari, Bakar, Luan, Samah, & Fooi 2009) report revealed that over 50% of the respondents used computers for research and lesson preparation in their schools. About 78% of the respondents complained of inadequate access to computers in classroom. Of

this percentage, 38% of the respondents stated that inadequate computers were not great barriers to ICT use in their teaching, but improved availability and fairness of access to technology resources by teachers, students and administrative staff is essential. Access to hardware and software is not only important, but also the use of suitable kind of tools and program to support teaching and learning (Tondeur, Valcke, & van Braak, 2008). "Access to appropriate technology means that affordances and constraints (Friedhoff, 2008, cited in Chen, 2010, p.3) of a technological tool need to be carefully considered when the tool is incorporated in lesson". Also, it is necessary to make a distinction of access to ICT resources. For instance, in a study of pre service teachers by Dexter & Reidel (2003), they revealed that 37.4% of the teachers had access to computers and 14.4% of the students had access to computers, implying that computers are more available to teachers than students. Obviously, to encourage student centred technology learning, it is necessary that learners have access to quality technology resources. Ubulum, Enyekit, Onuekwa and Amaehule, (2011) Analyses Information and Communication Technology accessibility and Utilization in Teaching of Business studies in Secondary Schools in Andoni of Rivers state Nigeria; with a sample of 66 business studies teachers. Their finding revealed that ICT facilities were not available, and access by teachers in Andoni, and that business studies teacher do not have the skills of utilizing ICT for teaching of the subjects. However, all the sampled teachers agreed on the applicability of ICT to Business studies.

2.8 Culture and Belief and their Influence on Teachers Attitudes to Information and Communication Technology (ICT)

Rokeach (1972) defined a belief as any proposition that begins with the phrase, 'I believe that ....' Beliefs that have many connections are often referred to as core or central beliefs as many other beliefs are based on, or have been shaped by, these beliefs: "The more a given belief is functionally connected or in communication with other beliefs, the more implications and consequences it has for other beliefs" (Rokeach, 1972, p. 5). Thus, core beliefs will be the most difficult to change, as their connections to other beliefs will likely need to be addressed as well (Richardson, 1996).

Teacher belief systems comprise a myriad of interacting, intersecting, and overlapping beliefs (Pajares, 1992). According to Hermans et al, 2008, "Belief systems consist of an eclectic mix of rules of thumb generalizations, opinions, values, and expectations grouped in a more or less structured way" (p 1500). Many have suggested that these belief systems influence how teachers use technology in the classroom (Angers & Machtmes, 2005; Hermans et al. 2008; Windschitl & Sahl, 2002). In a study by Haney, Lumpe, Czerniak, and Egan (2002), teacher beliefs were found to predict subsequent Classroom action for five of the six teachers they observed. In general, teachers with more traditional beliefs implement more traditional or 'low-level' technology uses, while Teachers with more constructivist beliefs implement more student-centered or 'high-level' technology uses (Judson, 2006; Roehrig et al., 2007). Hermans and his colleague actually found that "traditional beliefs had a negative impact on integrated use of Computers" (p. 1499).Longitudinal studies investigating teachers' adoption of technology have described a "pedagogical evolution" (Hennessey et al.,

2005) as teachers incorporate more technology into their practices. Hennessey et al. described a "gradual but perceptible shift in subject practice and thinking" (p. 186). Other researchers have reported similar findings (Hooper & Reiber, 1995; Levin & Wadmnay, 2005; Mills & Tischner, 2003; Windschitl & Sahl, 2002). In a ten-year longitudinal study of the Apple Classrooms of Tomorrow (ACOT) program, teachers' observations of changes in their students prompted them to reflect on their current beliefs about teaching and learning, which then led to changes in their beliefs (Sandholtz & Ringstaff, 1996; Sandholtz, Ringstaff, & Dwyer, 1997).

In addition to these pedagogical beliefs, there are additional beliefs attributed to value. Value beliefs encompass the perceived importance of particular goals and choices (Anderson & Maninger, 2007). In other words, teachers' value beliefs with regards to technology are based on whether or not they think technology can help them achieve the instructional goals they perceive to be most important (Watson, 2006). When a new pedagogical approach or tool is presented, teachers make value judgments about whether that approach or tool is relevant to their goals. The more valuable they judge an approach or tool to be, the more likely they are to use it. This is particularly true of technology (Zhao, Pugh, Sheldon, & Byers, 2002). When teachers learn how to use technology within their specific content areas and/or grade levels, they can more readily transfer that knowledge to their own classrooms (Hughes, 2005; Snoeyink & Ertmer, 2001/2002). When learning experiences are focused solely on the technology itself, with no specific connections to grade or content areas, teachers are unlikely to incorporate it into their pedagogical practices. Hughes (2005) noted "the more content specific the example, the more likely the teacher will see value and learn it" (p. 295).Tillema (1995) suggested that

beliefs act as a lens or filter when processing new information such as that obtained from textbooks, from knowledgeable others, or even from experience. According to Nespor (1987), early events (especially if particularly unique or vivid) can color our perceptions of subsequent events.

Thus, new information delivered through professional development programs is filtered through teachers' belief systems before being organized into their existing knowledge structures. As Richardson (1996) noted: "the beliefs that practicing teachers hold about subject matter, learning, and teaching [will] influence the way they approach staff development, what they learn from it, and how they change" (p. 105). More specifically, Tillema (1995) examined how teachers' existing beliefs impacted the knowledge acquisition process during a technology-training program. Results indicated that a greater correspondence between teachers' beliefs and training content led to greater learning. Others have described similar results; in order for teachers to incorporate new software or approaches into their existing knowledge structures, the uses first had to align with current beliefs (Hughes, 2005; Kanaya et al., 2005; Zhao & Frank, 2003).

Although beliefs can influence knowledge acquisition and use of technology, context can also play a hefty role in teachers' uses of technology. Teacher beliefs have been shown to be heavily influenced by the subject and school culture in which they participate. Windschitl and Sahl (2002) found teachers' technology uses were strongly influenced by beliefs, but these beliefs were shaped by the context of their institutions and profession: "The ways in which those teachers eventually integrated computers into classroom instruction were powerfully mediated by their interrelated belief systems about

learners in their school, about what constituted ‘good teaching’ in the context of the institutional culture, and about the role of technology in students' lives” (p. 575).

Culture as a Key Variable

For many teachers, possessing the relevant knowledge, confidence, and beliefs is enough to empower them to integrate technology into their classrooms in meaningful ways. We are probably all familiar with teachers who have managed to be successful users, despite facing multiple barriers, including the lack of support (Ertmer, Gopalakrisnan, & Ross, 2001). Yet, for the vast majority of teachers, this is still not enough, as research indicates innovative teachers are easily overpowered by the pressures to conform (Ponticell, 2003; Roehrig et al, 2007). “Teachers are not ‘free agents’ and their use of ICT for teaching and learning depends on the inter-locking cultural, social and organizational contexts in which they live and work” (Somekh, 2008). Maintaining membership in a group is important to people in general, and may be even more important to teachers, given the particularly strong cultures that exist within schools. Ponticell, (2003), Roehrig et al., (2007), Somekh, (2008), Zhao and Frank (2003) noted that a technology innovation was less likely to be adopted if it deviated too greatly from the existing values, beliefs, and practices of the teachers and administrators in the school. Conversely, changes in beliefs about technology use occurred more readily among teachers who were socialized by their peers to think differently about computer use. Brodie (2004) described this phenomenon of “culture pressure” using the concept of “meme”, which he defined as an “internal representation of knowledge that results in outward effects on the world” (p. 28). (Dictionary.com defines it as a cultural item that gets transmitted by repetition).

When people get immersed in a culture with strong memes, it tends to be a sink-or-swim proposition. Either you change your mind, succumbing to peer pressure and adopting the new memes as your own, or you struggle with the extremely uncomfortable feeling of being surrounded by people who think you're crazy or inadequate. The fact that you probably think the same about them is little consolation (Brodie, 2004).

The pressure to belong doesn't disappear after the tumultuous adolescent years, but Reappears in the form of norms, values, and shared beliefs among individuals in both work and social contexts. Each school and even each team of teachers within a school (discipline-based or grade-level based), has a set of norms that guides behaviors and instructional practices. These norms address everything from which values and goals are promoted, to which instructional methods are preferred, to which tools or resources are acceptable to use (Hennessey et al., 2005). Given this, it's not surprising that "Teachers are reluctant to adopt a technology that seems incompatible with the norms of a subject culture" (Hennessey et al., p. 161). One of the difficulties associated with introducing technology into the classroom is that it "consistently destabilizes the established routines of classroom life including norms of time and space" (Somekh, 2008, p. 452). Furthermore, experienced teachers who don't see the value of integrating technology into their classrooms can negatively impact the use of instructional technologies by newer teachers (Abbott & Faris, 2000; Hazzan,(2003). For example, Hazzan,(2003) examined novice high school mathematics teachers' attitudes toward integrating technology into their instruction. Results revealed perceptions of a negative undercurrent from veteran teachers toward such practices, discouraged novices from integrating technology into their lessons. Of course, culture or peer pressure can have positive results as well. For

example, peer pressure can provide the motivation we need to try things we otherwise wouldn't. Somekh (2008) described three schools (from 3 different countries) that enabled teachers to adopt technology in pedagogically meaningful ways. According to the author, schoolwide innovation occurred in situations in which "the principal's vision and motivation were of central importance" (p. 457) and the innovation led to a "change in the nature of teacher-teacher relationships, based on collaboration and mutual support" (pp. 457-58). Additionally, all three schools were noted as having these characteristics:

1. Schools were well-equipped with ICT
2. Focus was on changing the *process of learning* using ICT
3. Skills were acquired as part of the process of using them purposefully
4. Support was provided
5. Teachers had opportunities to discuss problems with peers and facilitators and explore solutions over time
6. Nature of students' learning changed along with the established epistemologies

If a school doesn't have these characteristics, it's still possible that meaningful technology uses can be initiated and supported by the subject culture to which a teacher belongs, although this is more likely to be true at a middle or high school level where teachers tend to work on grade level or discipline-based teams. In a recent study, Howard (2008) found that in a hierarchical culture (such as that which exists in schools), technology use was considered "low risk" as long as it was used in "approved" ways, that is, sanctioned by an expert, or person in authority. Although in most elementary or primary schools this authority would reside with the principal, in middle and high schools this role is often shared with the leader of a discipline- or grade-level team. The take-

away message here is that teachers' knowledge and beliefs appear to interact with the existing culture to create action. Ford (1992) proposed the concept of *personal agency beliefs* to explain how self- efficacy and context beliefs combine to create agency, or action. According to Ford, personal agency beliefs comprise "anticipatory evaluations" about whether one can achieve a goal, given 1) his/her personal capabilities and 2) the responsiveness of the environment (p. 45). If the individual anticipates that he/she will not be able to achieve the desired outcomes, due to constraints imposed by personal or contextual factors, the specific action is likely to be halted or not even undertaken at all.

The Intersection of Knowledge, Beliefs, and Culture: Implications for Practice

Literature related to teacher change, specifically related to technology integration, has focused extensively on the variables discussed here: knowledge, self-efficacy and pedagogical beliefs, and culture. When thinking about ways to change teachers' technology practices, we need to consider all of these factors or we are unlikely to be successful over the long term. Helping teachers achieve the types of changes we've described will require a two-pronged approach – one that addresses these changes during our teacher education programs and one that addresses them during professional development programs for practicing teachers. In this way, both sets of teachers can benefit from, and contribute to, these new visions for teaching and learning. In the next section, we provide specific suggestions for facilitating changes in teachers' knowledge, confidence, and beliefs that we believe can create a sustainable culture of 21st century teaching and learning.

2.9 Application of Information and Communication Technology in Teaching

Teaching and learning are thought of, not as separate and interdependent activities, but rather as two sides of the same coins; interconnected and interrelated. Studies of the applicability of ICT in teaching and learning in schools around the world identify four broad stages in way that teachers and students learn confidence in the use of ICT. (UNESCO; 2012) These four stages are discovering, learning how understanding how and when; and specializing the use of ICT Tools.

The first stage that teachers and learners go through in the application of ICT is of discovering ICT tools and their general functions and uses. In this stage, there is usually an emphasis on ICT Literacy and basic skills.

The second stage, learning how to use ICT tools and beginning to make use of them at different discipline. This stage involve the use of general and particular application of ICT and is linked with the applying approach.

The next stage which happened to be the third stage is understanding how and when to use ICT tools to achieve a particular purpose, such as completing a given project. This stage implies the ability to recognize situations where ICT will be helpful; choosing the most appropriate tools for a particular task; and using these tools in combination to solve real problem. This stage is linked with what is called infusing and transforming approach in ICT development.

The forth and last stage involve specializing in the use of ICT tools such as occurs when one enters more deeply into the science that creates and support ICT. In this stage teachers study ICT through conferences workshops and seminars to become specialist.

Dede (1996) asserted that in as much as expression and communication are based on representation like languages and imagery, the process of broadening these types of instructional messages given to students would enhance learning that Educators can rely on, the most applicable way to broaden the instructional messages is to apply ICT.

Akan (2002) in Ikenga, Akiti and Onyemah (2002) outlined some characteristics that differentiate this technology revolution from others that have taken place before it, which are as follows:

i. It is happening at an extremely fast pace

ii. It is impacting all corners of the globe

iii. The demand for ICT products is insatiable and the generation that has grown up with information technology has developed intuitive means of absorbing and exploiting the capacities that technology has offers sometimes to the bewildment of other generation.

iv. Okwelle (2007); Citing Anumihe (2004), maintained that the revolution and regulations created by Information and Communication Technology (ICT) were not about to stop or even slow down. The only option for teachers is adopt, change and evolve. Interestingly education appears to be the major sector where ICTs integration and effective application would extend massively to other vital sectors of the economy. Teachers are, therefore, responsible for the accomplishment of educational objectives. It becomes imperative that the quality required in every ramification of their teaching should be vigorously and aptly pursued and ascertained (Ereugbor, 2008).

The world population stands at about 5.6 Billion in 1995, and is expected to reach 6 Billion before the turn of the century. Most of the current annual increase, nearly 90

Million people per year; is occurring in developing countries (Including Nigeria). By 2005, according to United Nation projections, the total will have grown to between 7.6 Billion to 9.0 Billion with 8.3 Billion considered the most likely figure, (Ashford, 1995).

Olumorin (2008), rightly asserted that there are more people in the world than ever before; and greater part of them wants an education. to be able to cope with the desired need of educating populace more efficiently, a high tech tools and equipment that can stand the test of time, which can help to teach and learn at a faster rate; diagnose, store, retrieve information are desirable.

In order to avoid a setback in achieving sustainable growth as a nation, there is need to avert becoming a victim of what is called digital divide. Digital divide is that which refers to the dichotomy that may exist between a developing country like Nigeria and nations that have information Technology policies built on reliable human resources and infrastructural tools and means of assessing, planning and managing developmental changes. It is in line with this that Federal Republic of Nigeria (FRN 2001) came up with the Nigerian National Policy for information Technology (NNPIT) Tagged “use it”.

The FRN 2001, (NNPIT) has education as the first major focus under the mission statement. It had under the general objectives, a strong focus on items xv, xvii and xxiv where it stated. “To prepare the youth on IT skills and prepare them for global competitiveness” “To establish near multifaceted IT institutions as centers of excellence to ensure Nigeria’s competitiveness in international market” (PP:IV – V).

In order to achieve the FRN (2001) Objectives, certain policies were put in place to enhance quick implementation. One of such is the restructuring of the education

system at all levels to respond effectively to the challenges of the information age, particularly putting aside special IT fund for education at all levels (P.VI).

The FRN (2001) Objectives; which are mainly educational viewed information Technology (IT) from a broader perspective. The strategies outlined under the human resource development include, among others, capacity building for the stakeholders in the institutions and adequate financial provision for tools and resources.

It is also outlined that relevant IT Curricular for Primary, Secondary and Tertiary Institutions be developed; and that such curricular will be based on the appropriate national syllabus at the selected level and other global certification syllable; in addition to other government policy such as UBE, the proposed digital Library and the virtual University system" (P:2) FRN 2001).

There is hardly any area in education where Information and Communication Technology is not Applicable. It only requires the Science or Technical competence on how to apply it for desired output. The application of ICT could be likened to the application of Mathematics to the science, social sciences, Humanities and host of others. There are many other studies which provide collaborating evidence about the Applicability of ICT in teaching. Cox, Preston, and Cox (1999) reported a study of UK impact of IT on children English Learning at Secondary School demonstrated the Applicability of the ICT in Language Teaching and Learning. His findings revealed a significant positive attitude toward ICT.

Languages: Many examples of the use of ICT can be introduced in language teaching, here are example.

i. Word Processing: The Most common Application of ICT in Languages is word processing to create, for example, letters and other document. Teachers can create close reading (with missing words or missing punctuation) for students to complete using spelling and Grammar checkers in a proper way can give students a feeling of self confidence when producing written tests (UNESCO: 2002 :85).

ii. Composing Document and Presentations: Students fund it motivating to produce report on topics in their mother tongue or a foreign language using ICT tools.

iii. Information and communication. Nothing seems to be more motivating for students than to communicate to a native speaker of a language setting up email links such as computer pen pals, mini web; multilingual language learning, Video Conferencing, 2go, Twitter, Facebook will be quite normal way to communicate online.

The information that is available on the internet about a foreign country and a foreign language can be used in many different ways to give assignments and tasks to students and provide context and cultural background information to make learning more real.

ICT in Natural sciences: A few of many ways that ICT can be used effectively in the teaching of natural sciences are illustrated in the following example. (UNESCO: 2002).

i. Spreadsheets: Students can use spreadsheets to tabulate and calculate results of experiments. The use of spreadsheets is the clearest and quickest way to demonstrate how manipulative a particular variable produce certain effects. Teachers can prepare templates

that have values already entered to illustrate effect of manipulative variables, which is most appropriate for work on simulation and modeling.

ii. Data Base. Teachers can prepare a data base into which students can add data for storing variables such as characteristics of chemical elements in the periodic table; characteristics of plants and Mammals, and then interrogate these databases to find relationship and commonalities.

iii. Information and communication: Teacher can use ICT tools for students to communicate with other students on a local network, or with students in other schools, both locally and overseas. For research; and for specific assignments, information available on the internet can be used. Online data can be retrieved and shared with others about topics such as the weather, the state of the environment. Space programmes, and so on. In Mathematical Science students can use applets that are readily available on the internet for performing Mathematical activities and solving certain Mathematical problems.

iv. Measurement: Using mechanical temperament and other probes to monitor experiments and feeding the readings directly into a spreadsheet or graphic program; helps to obtain reliable results more easily and make classroom work more realistic. Several software tools exist that take readings, present these graphically and aid interpretation.

ICT in social sciences: The teaching of social Science subjects can be greatly enhanced by the use of ICT as illustrate by UNESCO (2002) in the following examples.

i. Composing Documents and presentations: Producing reports using ICT tools in history, Geography or economics topics is highly motivational for students. Enjoy adding graphics, photographs; pictures and other information about a topic or reports they write and presentations they make.

ii. Information and communication: A whole range of graphical information; including diagrams, photographs and other pictures is readily available on the internet. Other information can be researched using internet to include reports, to give context to a topic discussed in the curriculum; and to make classroom learning more closely approximate to what occurs in the work place. One problem to which attention need to be given is that some students just copy into their presentation materials from the web without acknowledgement or use materials from other students.

iii. Spreadsheets and Database: In the social sciences spreadsheets and databases serve a similar purpose, namely to enable students to systematize and organize information. For example students can use spreadsheet to make a last of dates, events, countries and persons involved. Such list can then be organized by date, by country, or by a person name to make effective study aid.

The various ICT Facilities used in the teaching learning process in schools according to Babajide and Bolayi (2003), Bryers (2004), Bandele (2006) and Ofudu (2007) include; Radio Television, Computers, Overhead Projectors; Optical fibres, fax Machine, CD-ROM Internet electronic notice board, slides, Digital Multimedia, Video/VCD Machine and so on.

2.10 Influence of ICT on Teaching/Learning Environment:

It has been argued earlier that ICT is a mediator of learning as a component of the learning environment. While it is difficult to measure and directly demonstrate the impact of ICT in schools on learning, it is possible to suggest possible impacts by connecting ICT as a mediator with well researched theories of learning and strategies for providing learning opportunities. The Committee of Developments in the Science of Learning (CDS 2000) as stated by Ibrahim (2010) completed such an exercise and stated "several groups have reviewed the literature on technology and learning and concluded that it has great potential to enhance student achievement and teacher teaching, but only if it is used appropriately" Ibrahim, A (2010:27). Such influence as explained by Ibrahim (2010) includes:

a. investigating reality and building knowledge

b. active learning and authentic assessment

c. engage students motivation and challenge

d. provide tools to increase students productivity

e. provide scaffolding to support higher level thinking

f. increase learners' independence

g. collaborative and cooperative learning

h. tailoring learning to the learner

2.10.1 Investigating Reality and Building Knowledge

ICT allows students to investigate more thoroughly the real world (Reginald, Gregoire, Bracewell, & Laferriere 1996, Riel 1998). They can more readily access information sources outside the classroom and use tools to analyses and interpret such information they may access through online systems or through data logging systems (Riel, 1998). The technologies allow them to receive feedback, refine their understanding, build new knowledge and transfer from school to non-school settings (CDS 2000)

2.10.2 Active Learning and Authentic Assessment

In many classroom situations it is difficult to allow students to be sufficiently active as participants. Typically, students are often passive spending a lot of time listening or reading. It is well known that students are more likely to be interested and attentive and will achieve a wider range of learning outcomes if they can be active, and learn by doing. Their engagement with the curriculum will increase as they are afforded opportunities to create their own information and represent their own ideas. ICT software can be used to provide students with learning experiences where they are interacting with information, ideas, opinion and views of other and they can also express their views, ideas, opinions, and understanding of facts, concepts and curricula contents.

2.10.3 Engage Students by Motivation and Challenging

The interactive and multimedia nature of ICT facilities and systems has provided the opportunity for software developers to create increasingly more stimulating features. Many studies have found that students like to use computers and are likely to develop more positive attitude towards their learning by themselves when they use computers

(Reginald, Gregoire, 1996, Schacter 1999). Computer systems do provide the opportunity to create a wide range of interesting experiences (CDS 2000). This is likely to help to maintain student interest and interest a wider range of students (Cradle & Bridgforth 2002).

2.10.4 Provide Tools to Increase Student Productivity

In the past students have spent a lot of time doing repetitive, low-level tasks particularly involving writing, drawing and computation, while it may be necessary for students to develop these skills at some time on most occasions they are pre-requisite to some higher level task. Unnecessary repetition of low-level tasks is inefficient, non-motivational and may obscure the real purpose of the learning activity. Many computer applications provide the tools to support students in quickly completing these lower—level tasks so that they can focus on the main purpose of the activity. Word processors, graphics packages, database packages spreadsheets and other software support the performance of the students.

2.10.5 Provide Scaffolding to Support Higher Level Thinking

There is an increasing range of software tools which can be used to support the development of higher level thinking skills such as application, analysis and synthesis (Reginald Gregoire 1996, Riel 1998, NFID 2001). Tools can be used to analyses data, present data, link data or information, present information in different formats, simulate environment and conditions, and support interactive communication (CDS 2000). This allows teachers to consider providing a range of activities to assist students to become critical thinkers, designers and problem solvers. Computer systems provide a wider range

of motivating situations in which students can develop and apply these higher level thinking and provide opportunities to develop 'deep knowledge' (CDS 2000).

2.10.6 Increasing Learner Independence

Computer systems are increasingly being used to provide learning experiences when and where they are needed. This provides students with greater independence nit only in terms of when and where they learn but also what they teach (Cradler & Bridgforth, 2002). It is not necessary for all students to do the same thing at the same time. Teachers may provide students with access to software allowing students to select different learning experiences. The class does not have to be treated as one group. Individuals or groups of students may consider learning topics independently of the teacher. This is often discussed in terms of lifelong learning, learner-driven learning or project-based learning. ICT tools can be used to create records of thoughts and support (Riel, 1998).

2.10.7 Collaborative and Cooperative Learning

Researchers have found that typically the use of ICT leads to more cooperation among learners within and beyond school and a more interactive relationship between students and teachers (Reginald Gregoire, 1996). Collaboration is a philosophy of interaction and personal lifestyle where individuals are responsible for their actions including learning and respect the abilities and contributions of their peers. Cooperation is a structure of interaction to facilitate the accomplishment of a specific end product or goal through people working together in groups. Studies have found that ICT provides good support for team-based project work (Riel, 1998, NFID 2001). The use of ICT to

support collaborative and cooperative learning is extrapolated to the support of a learning community (Riel, 1998).

2.10.8 Tailoring Learning to the Learner

In most traditional learning situations it is not possible to provide each student with an instructor and for that instructor to specially design learning experiences for tha student. The closest to this is the apprenticeship system. The programmability and interactivity possible with the computer systems provides the opportunity to develop software which simulates the role of an instructor. Intelligent tutoring software may use information about the student to recommend appropriate sequences or sections of a tutorial for the student. Many studies have found that using computer-based instruction can increase achievement scores by at least one standard deviation although this is neither uniform nor consistent across all areas of study (Schacter, 1999, CDS 2000, NFID 2001). The ideal is that the software allows the student and/ or teacher to tailor the learning experiences to suit the individual student.

Cradle & Bridgforth, (2002) observed that each student may encounter different experiences when using the same piece of software. The technology has been used successfully for teachers to give students feedback that is timelier and more individualistic (CDS 2000). Assessment of learning can use more demanding methods and better diagnose the needs of learners. The use of online technologies is often used to provide more individualized programmes (Eadie, 2000). Computer software can also be used to support children who require individual learning programmes (e.g. gifted, distance education or remedial). Students can be provided with computer support for

learning activities tailored to their individual needs. Schacter (1999) study has shown increased achievement in special needs children when computers were used. This agreed with Patrick (1998) findings in his study of computer and its impact on teaching and learning that computer will and is changing the traditional pattern of in our schools. He stressed the administrative and paper work which a teacher is usually engage in, will be drastically reduced to its barest minimum. Again with the proper application of computer technology, teachers' role in the class will just be to assist the students to solve the difficult in interacting with computers. Thus the emergence of ICT has the profound implication of making the traditional methods of teaching and learning to be performed by "machines".

2.11 Factors Influencing Classroom Uses of ICT

While Scientists, Policy makers, environmentalists, and the public have been concerned about the problem of pollution and economical consequences of the very rapid dispersal of the air and water pollution; educational researchers and practitioners; policy makers; and the public have been equally concerned about frustratingly slow adoption of Information and Communication Technology (ICT) tools and equipment in Schools. Like many educational reform efforts, the introduction of technology in Schools has been less successful (Ajayi, 2008, Ajayi and Ekundayo, 2009, Olumorin, 2008 Waheed, 2011). Despite the generous investment in; and increased presented of ICT tools in Schools (Ofudo, 2007, Ezeugbor, 2008).

Trucane (2005) in his book 'Teacher Teaching and ICT: A Knowledge Map on Information and Communication Technology in Education' identified the followings among others as factors influencing classroom uses of ICT;

a) functional technical infrastructure

b) time

c) support from school Administration

d) a variety of change to be implemented.

Functional technical infrastructure: teachers must have adequate access to functional computers and be provided with sufficient technical support if they are to use ICT effectively.

Time: introducing ICT takes time. Adequate time must be allowed for teachers to develop new skills, explore their integration into existing teaching practice and curriculum, and undertake additional lesson planning, if ICTs are to be used affectively.

Support from school Administration and Community: support of the school administrators and in some cases, the surrounding community, for teacher use of ICTs is seen as a critical if ICTs are to be used at all, let alone effectively.

A variety of change must be implemented to optimize teachers use of ICTs: shifting pedagogies, redesigning the curriculum and assessment and providing more autonomy to the schools help to optimize the use of ICT. With sufficient enabling factors in place, teachers can utilize ICT efficiently and effectively.

Some researchers believe that Schools, being the social organization they are directly at odds with near technologies. The goal of Schools as organizations, according to Hodas (1993), is not to solve a defined problem but to relieve street on organization caused by pressure operating out outside of or overwhelming the capacity of normal channels". In other words, schools naturally and necessarily resist changes that will put pressure on the existing practice.

"what appears to outsiders as a straight forward improvement can; to an organization; be felt as undesirably disruptive if it means that culture must change its values and habits in order to implement it" (Hodas, 1993, P.2).

Besides this inherent resistant to change, Schools are also said to have a structure that prevents wide spread uses of ICT. Collins (1996) in his reflective essay on his experience with the apple classroom f Tomorrow (ACOT) Project cited limited classroom space and the bulky size of computers, teachers' unwillingness to take students to the lab; and lack of access to computers at home as factors that limit the use of technology in Schools.

A more frequently cited set of factors affecting technology uses in Schools is associated with the teacher. Following the standard diffusion literature (e.g. Rogers; 1995); teachers attitudes towards and expertise with technology have often been identified as key factors associated with their uses of technology (Korte and Husing, 2007, Beita, 2008, 2hao & Frank, 2009).

Technology itself has also been named as the source of a set of factors that affect its uses by teachers. First, there are conflicting ideas about the value of technology and

hence conflicting advice to teachers about how technology should be used in Schools (Cuban, 1999). This leads teachers to a state of confusion about the educational values of technology. Second; the constant changing nature of technology makes it difficult for teachers to stay current with the latest technology. Everyday new software and hardware become available.

Teachers; who are already struggling for time and energy, fund it difficult and discouraging to keep chasing this elusive beast. Third, the inherent nature of unreliability makes technology less appealing for most teachers (Cubam, 1999, Zhao & Frank (2009).

Technology is inherently unreliable and can break down at any time but teachers; who have only a limited amount of time in front of students; can not spend the time trouble shooting problems they may or may not be able to solve. Thus unless there is a strong need for use of technology and reliable support; teachers may opt not to use it in their teaching.

Cox, Preston & Cox (1999) in their study of what motivates teachers to use ICT revealed that factors which correlate positively with ICT uses in schools were:

- Perceived ability to use ICT
- Level of resources available.
- Teacher satisfaction with IT, and
- Whether using IT in teaching is considered to be interesting and enjoyable.

The most significant negative factor was difficulties experienced in using IT

Zhao and Frank (2009) argued that while there are many factors which can reside a multiple levels of Educational hierarchy and type of ICT use by a teacher are two things. The nature of the use and the result of the teacher's cost benefit analysis of the use. All other factors contribute to these two things. In other words, these factors do not directly influence technology uses in a linear fashion but rather their influence is mediated by and filtered by teachers' perceptions.

In summary; previous researchers has resulted in a long; almost exhaustive; list of factors that may we effect uses of technology in Schools. However, these factors are often examined in isolation of each cognitive; some social; some organizational; some technological and still some Psychological.

2.12. Teacher Effect of Utilization of ICT in Classroom Pedagogy

Several researches were conducted on the effect of utilization of ICT in classroom pedagogy (Passey, & Roger, 2004. Hussain & Safdar 2008; Ubulom, Enyekit, Onuekwa & Amaehule 2011).

Hussain, and Safdar, (2008) study the impact of the Utilization of Information and Communication Technology (ICT) among University students in Turkey. Their funding revealed that Utilization of ICT has the following potentials.

- Present the material in a more interesting and attractive way.
- Guide and help students in searching the qualitative material.
- Make best use of time.

- Direct students toward cooperative as well as collaborative learning activities.
- Prepare learning material for students, rather teaching in conventional situations.
- Diagnose the learning problem of students and help them to overcome.
- Solve the study problems of students; (Hussain & Safdar, 2008).

In a study involving a wide range of data collection during the spring and summer terms 2003; (Passey Rogers, Machell and Mchugh 2004), interview were undertaken with a total of 121 head teachers, teachers and classroom assistance, 22 parents; and 126 students; as well as 24 youth and community workers; health workers, career officers, and police officers, observation were undertaken in 33 classrooms, and documentary evidence was collected; Questionnaires were completed by a representative sample of 1,206 students, their finding among others things includes:

- ICT use by teachers and students led to positive motivational outcomes, supporting a focus upon learning and the tackling of learning tasks.
- More positive motivation when ICT use was focused on teaching and learning, then when ICT was use to support teaching alone.
- Both girls and boys were both motivated by uses of ICT Male
- Younger teachers with less teaching experience and Secondary School Teachers are more likely to have higher levels of ICT Competence.
- Part time teachers are less likely to integrate ICT within teaching and Learning than full time teachers.

- Training on how to use integrate ICT in the classroom had the most positive impacts on a teacher level of ICT integration

A wide range of motivational impacts of ICT on students were reported in the study. All Secondary School teachers interviewed indicated that they felt that ICT had a positive impact upon students' interest in and attitudes toward School work. They felt that ICT help students to take pride in their work; that it was helpful for coursework; it supported research; that students were taking a genuine interest in the quality of their work, and that it was more likely that task would be completed and on time. Some teachers felt that it did depend upon what was being done, but that interest was stimulated even if some times content was not affected.

2.13 Summary and Uniqueness of the Study

The knowledge and skills of ICT if adequately acquired create opportunity to gain limited knowledge in the area of communication technology. It is also relevant to all areas of human endeavor. This can be deducted from studies carried out by Ofodu (2007) Ezekoka, (2008) Siray-Batch Ford (2009) Byerly and Brodie (1999). Inline with their findings the application of ICT to teaching and learning was reviewed (Unesco, 2012; Dede, 1996; Ubolum, Enyekit, Onekakwa & Ameahule, 2011; Cox, Preston & Cox, 1999; Babayide & Bolayi, 2003; Bryers, 2004; Bandale 2006;). It was also revealed that teachers at one time or the other applied the use of ICT in certain areas of their routine as facilitators and transmitters of knowledge.

Emphatically, studies also revealed at various point carrying out their routine of teaching attitudes of teachers have been seen as disposition of their acceptance of the

usefulness of the technology and its integration in teaching (Huang & Kiaw, 2005; Korte & Husing, 2007; Becta; 2008; Hew & Brush, 2007; Keengwe & Onchavaric, 2008; Albirini,2005; Samak, 2008). Similarly, Ajayi, (2008); Ajayi & Ekundayo, and Haastrap (2009); Andoh (2012) Drent & Meelissen (2008) investigated the attitude of teachers to ICT at various levels and discipline. Their findings indicated that teachers must have positive attitudes to the use of ICT.

Concerning utilization of ICT in teaching; Hussain and Safdar (2008) Passey, Rogers, Machell & Mchugh (2004) are of the opinion that ICT has the potential of achieving a meaningful teaching and learning process and product in this knowledge and information age. Similarly, studies by Ajayi (2008) Ajayi, Ekundayo & Haatrap (2009) revealed that teachers perceptions of the benefits of using ICT in teaching to be high.

However, while there are a number of studies on teachers' attitudes, competencies and access of ICT in secondary schools in developed countries or in other part of Nigeria, there is lack of study on teachers' attitudes, competencies and access on utilization of Information and Communication Technology (ICT) in teaching among secondary schools in Kano and Jigawa States. This is the rationale for carrying out this study.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter addresses the Methodology used in conducting this research, in the following order of presentations, Research design; population and sample; instrument for data collection; Validation of instrument for data collection; Reliability of the instrument; procedure for data collection and Data Analysis Techniques.

3.2 Research Design

The descriptive survey method was employed for the conduct of this research. Descriptive educational researches are set out to describe and to interpret what is. Descriptive survey research, according to Best, is concerned with

> *Conditions or relationships that exist; practices that prevail; Beliefs, points of views or attitudes that are held; processes That are going on; effects that are being felt; or trends that are Developing: At times, descriptive research is concerned with What is or what exists and is related to some preceding event that Has influenced or affected a present condition or event (Best: 1970).*

Such studies look at individuals, groups, institutions; methods and materials; in order to describe, compare, contrast, classify analyses and interpret the entities and events that constitute their various fields of enquiry.

Typically, surveys gather data at a particular point in time with the intention of describing the nature of existing conditions; or identifying standard against which

existing conditions can be compared, or determining the relationships that exist between specific events.

A survey has several characteristics and several claimed attractions; typically it is used to scan a wide field of issues; populations, programme in order to measure or describe any generalized features. It is useful (Morrison; 1993) in that it usually:

- Gather data on a one-shot basis and hence is economical and efficient.
- Represents a wide target population.
- Supports or refutes hypotheses about the target population.
- Makes generalizations about; and observes patterns of responses in the targets of focus.
- Usually relies on large scale data gathering from a wide population in order to enable generalizations to be made about given factors or variables.
- Convenient data gathering
- Good statistical significance
- Precise results e.t.c.

The survey design involves the generation of data through visitation and contact with relevant places and persons. It involves gathering facts on the problem based on field visitation to obtain the necessary data. Basic data with which this design is concerned has to do with information, facts, figures and indices that are collected directly

from the target population. In other words, the information required in this research is such that it can be directly obtained only from the population under study.

3.3 Population and Sample

3.3.1 Population of the study

In any educational research it is important to have a precise description of the population. Population in this study refers to the persons, objects and organizations that form the focus of this study. There are a total of 352 senior secondary schools in Kano and Jigawa States. This comprise 187 senior secondary School from Kano state; and 127 from Jigawa State. In addition, there are 7525 senior secondary school teachers in the two states comprising 5380 from Kano State and 2145 from Jigawa State (Nigerian Educational Statistic Digest, 2010). The population is characterized by Gender (Male and Female), various educational qualifications mostly, B. A. (Ed), BSc. (Ed) B. Ed, BS..c, B.A., HND, and N.C.E., as well as varied years of teaching experiences ranging from 0 – 5 years, 6 – 10 years, and few 11years and above.

3.3.2. Sample of the study

The quality of a piece of research not only stands to fall by the appropriateness of methodology and instrumentation but also by the suitability of the sampling strategy that has been adopted. Factors such as expense; time and accessibility prevent the researcher from gaining information from the whole population. A total of three hundred and eighty six (386) teachers were selected for this study comprising one hundred and fourty five (145) from Jigawa State, two hundred and eighty six (241) from Kano State. Thirty five

(35) Senior Secondary schools were randomly selected as the focus schools. This comprise of twenty from Kano state, fifteen from Jigawa

Table 3.1 Summary of Sample Size

State	Number of schools selected	Number of teachers selected
Kano	20	241
Jigawa	15	145
Total	**35**	**386**

3.2.3 Sampling Technique

Sampling procedure is a plan specifying how elements are drawn from the population (Ujo, 2008). Sampling was done on two stages. Identifying and selection of schools based on the proportion of school by State. This was done using proportionate sampling technique where number of schools was selected based on their proportion by state. A systematic simple random sampling was used to select the sampled teachers. This is in order to give every member of the population an equal chance of being selected in such a way that the selection of one did not block or affect the selection of others. To allow equal chance of being selected, a random sampling procedure (Balloting method) was used to sample One hundred and fourty five (145) teachers from Jigawa State as well as Two Hundred and fourty one (241) from Kano State. The researcher obtained the list of all senior secondary schools from each of the states, and then assigned numbers to all

the schools and the papers folded so that the numbers are hidden. Clerk from the Ministries were invited to dip their hand into the basket containing the pieces of papers and pick one paper at a time until all the schools were selected. The number on the papers was crosschecked with the list already at hand and the names of the Schools were recorded. The researcher repeated similar procedure at schools level in selecting the respondents. The list of all teachers in the school was collected from the Principals, numbers assigned, folded and a clerk was invited to pick one after the other until the subjects were selected from each school.

3.4 Data Collection Instrument

The instrument used in this study was a questionnaire adopted from a recent study of teachers' attitudes and use of Information and Communication Technology in Syria by Albirini (2004, 2005).

The Instrument (Teachers Attitude towards the Use of ICT in Teaching) was adopted for three main reasons. First, the Instrument had established validity and reliability, secondly; the Instrument reflected recent researches on the use of Information and Communication Technology (ICT) in teaching and learning; and thirdly Albirini (2004, 2005) study had similar focus with this research.

The researcher obtained Albirini's permission to use the Instrument (see Appendix A)

3.4.1 Description of the Instrument

The instrument, which for the purposes of this study was known as teachers' attitudes, competencies and access on the utilization of ICT in teaching, contained five sections, each of which represented one of the variables examined in the research

questions. These sections were labeled: 1) Teacher Characteristics 2) Attitudes towards ICT; 3); Perceived Computer Attributes;4) Perceived Computer Competences; and 5) Perceived Computer Access.

Attitudes towards ICT

This section consisted of 20 statements divided into three subscales: affective (Items 1-6), cognitive (items 7-15), and behavioral (items 16-20). Affective questions referred to the teacher's feelings about ICT in education; cognitive questions referred to the teacher's actual knowledge of ICT, and behavioral questions referred to the teacher's explicit use of and behavior towards ICT. As in Albirini's study (2004, p. 62), the combined score of the 20 items in this section represented the dependent variable for this study. All the items were on a 5-point Likert-type scale ranging from *strongly disagree* (1), to *disagree* (2), to *neutral* (3), to *disagree* (4) to *strongly disagree* (5). According to Albirini, (2004, 2005)

The responses were reduced to a mean score that demonstrates how positive or negative each respondent's attitude towards ICT was. Since respondents rated their attitudes on each item from *strongly disagree* (1) to *strongly agree* (5), the range of possible mean scores was between 1 and 5, with higher scores indicating positive attitudes. In this study, this same summative method was used to create a score for this section.

Perceived ICT Attributes

Of the five innovation attributes identified by Rogers (1995), only four—relative advantage, compatibility, complexity, and observability—were examined in Albirini's (2004) questionnaire. Trialibility, the fifth attribute identified by Rogers, was not

examined because the majority of teachers in the Mid-East had no chance to experiment with computers before they were introduced into schools The Perceived Computer Attributes Scale consisted of 18 Likert-type statements. The items were grouped into four subscales corresponding to the four innovation attributes mentioned above. Thus, items 21-25 measured teacher perceptions concerning the relative advantages of ICT, items 26-30 measured perceptions of computer compatibility, items 30-34 measured perceptions of computer complexity, and items 35- 38 measured perceptions of computer observability. To ensure systematicity in the negative/positive direction of all subscales, the negative items of the complexity subscale were reversed, and thus the simplicity (non-complexity) of ICT was measured. In other words, higher scores on the complexity subscale indicated positive perceptions about the simplicity of ICT (or negative perceptions of the complexity of ICT) and not the opposite. The scaling and the rating of the overall Perceived Computer Attributes scale were the same as that of the Attitudes toward ICT Scale, with higher scores indicating more positive perceptions of computer attributes.

Perceived Computer Competence

The Perceived Computer Competence Scale consisted of 15 items. The items focused on the common uses of computers in education: software installation (item 1), basic hardware (items 2-3), productivity software (e.g., word processing; items 4-7), telecommunication resources (items 8-9), basic troubleshooting (item 10), graphic application (item 11), grade keeping (item 12), educational software evaluation (item 13), organization tools (e.g., use of folders) (item 14), and virus handling (item 15). Computer Competence was quantified by the score of the 15 items on a four-point scale, ranging from *no competence* (1), to *little competence* (2), to *moderate competence* (3), to *much*

competence (4). The responses were reduced to a mean score that demonstrated the level of each respondent's perceived computer competence, with higher scores indicating greater competence.

Perceived Computer Access

The Perceived Computer Access Scale consisted of three statements that took into account the possible locations where computers might be available for use by the EFL teachers: at home, in school, and other places (the last choice was given to accommodate locations not mentioned in the first two guided responses). Computer Access, as an independent variable, was quantified by the respondent's score on the three access-related items, each measured according to a 5-point scale, ranging from *never* (1), to *once a month* (2), to *once a week* (3), to *2 or 3 times a week* (4), to *daily* (5). The responses were reduced to a mean score indicating each respondent's perceived level of computer access, with higher scores indicating greater computer access.

3.5. Validation of the Instrument

3.5.1 Validity of the Instrument

Though the instrument has been validated by Albirini, the researcher consider it necessary, to revalidate it. The instrument after being approved by the Supervisor was given to two other lecturers from the Department of Library and Information Sciences, Bayero University, Kano for face and content Validation.

3.5.2 Reliability of the Instrument

The Instrument used in this study was adapted from Albirini (2004-2005). The version had established validity and reliability (0.82) by Albirini, however, since the

instrument was used in a different setting, the reliability had to be calculated. The reliability of the Instrument was established through test re-test method with an interval of two weeks on some selected Secondary School teachers in the States using Person Product Moment Correlation formula. One of the most common methods for establishing reliability is the Cronbach's Alpha Coefficient (Graziano & Raulin, 1997). Thus Cronbach's alpha was used to determine the internal consistency of items within each scale.

Reliability statistics

Test type	Cronbach alpha	No of items
Test		
Tetest	.802	69

The reliability of Computer access has not been calculated because of the fewer number of items on the scale.

Table: Reliability coefficient of ICT survey

Scale	Reliability Coefficient
Attitudes towards ICT	0.92
Affective	0.79
Cognitive	0.84
Behavioral	0.85
Computer attributes	0.87
Relative advantage	0.77
Compatibility	0.61
Complexity	0.67
Observability	0.70
Competencies in ICT	0.81
Access to ICT facilities	0.94

3.6 Data Collection

The Instrument was personally administered by the researcher with the help of research assistant in the sampled Secondary Schools. The researcher went to the Schools in the Morning, distributed the questionnaire and waited to collect it back.

3.7 Procedure for Data Analysis

The statistical tools used in the presentation and analysis of data are the frequency percentage ranking, mean scores, and Standard deviations to answer research questions. Pearson Product Moment Correlation (PPMC) was used to test 3 hypotheses.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Introduction

In this chapter, results derived from the analyzed data arising from research carried out are presented. The analyses were done using research questions 1 to 7 as bases. Percentages ranking, frequency counts, mean, and standard deviation were used to answer the research questions. Pearson product moment correlation coefficient was used to test the three hypothesis in this study.

4.2 Summary of Data

Information about background characteristics of respondents who adequately filled and returned the questionnaire for the study is shown in table 4. 1 - 4. 3.

Table 4.1
Distribution of Respondents by Educational Qualifications

Qualification	Frequency	Percent (%)
B.A(Ed) BSc.(Ed)B.(Ed)	126	32.6%
BSc./HND	78	20.2%
N.C.E.	141	36.5%
Diploma	36	9.3%
Others	5	1.3%
Total	**386**	**100%**

The table 4.1 shows respondents educational qualifications where it was found out that 53% are Graduate and HND holders, 36.5% of teachers are NCE holders, 9.3% Diploma holders, and the least 1.2% have M.sc/M.ed.

Table 4.2
Distribution of Respondents by Years of Teaching Experience

Years	Frequency	Percent (%)
0-5 years	136	35.2%
6-10 years	154	39.9%
11 and above	96	24.9%
Total	**386**	**100.0%**

Table 4.2 shows that 39.9% of the respondents have 6-10 years working experience, 35.2% 0-5 years teaching experience and the remaining 24.9% have 11 years and above teaching experience.

Table 4.3
Distribution of Respondents by Gender

Gender	Frequency	Percent (%)
Male	294	76.2%
Female	92	23.8%
Total	**386**	**100%**

Table 4.3 shows the sex of the respondents where it was found that 76.2% are male and 23.8% were female

4.3. Data Analyses

RQ1: What are the attitude of Senior Secondary School Teachers towards the use of Information and Communication Technology (ICT) in Teaching?

Table 4.4 Teachers responses on their attitude toward use of Information and Communication Technology in teaching

N	Items	SD	D	N	A	SA	M	SD
1	Computers do not scare me at all	70 (18.1%)	71 (18.4%)	22 (5.7%)	138 (35.8%)	85 (22%)	3.25	1.44
2	Computers make me feel uncomfortable	167 (43.3%)	141 (36.5%)	17 (4.4%)	41 (10.6%)	20 (5.2%)	1.97	1.17
3	I am glad there are more computers these days	18 (4.7%)	45 (11.7%)	26 (6.7%)	202 (52.3)	95 (24.6%)	3.80	1.07
4	I do not like talking with others about computers	65 (16.8%)	139 (36%)	117 (30.3%)	45 (11.7%)	20 (5.2%)	2.52	1.06
5	Using computers is enjoyable	21 (5.4%)	49 (12.7%)	23 (6%)	142 (36.8%)	151 (39.1%)	3.91	1.20
6	I dislike using computers in teaching	105 (27.2%)	166 (43%)	68 (17.6%)	23 (6%)	24 (6.2%)	2.20	1.09
7	Computers save time and effort	43 (11.1%)	21 (5.4%)	13 (3.4%)	179 (46.4%)	130 (33.7%)	3.86	1.25
8	Schools would be a better place without computers	172 (44.6%)	116 (30.1%)	18 (4.7%)	66 (15.5%)	20 (5.2%)	2.06	1.25
9	Students must use computers in all subject matters	39 (10.1%)	79 (20.5%)	59 (15.3%)	162 (4.2%)	47 (12.2%)	3.25	1.20
10	Learning about computers is a waste of time	190 (49.2%)	103 (28%)	12 (3.1%)	58 (15%)	18 (4.7%)	1.97	1.24
11	Computes would motivate students to do more study	18 (49.2%)	108 (28%)	12 (3.1%)	58 (15%)	18 (4.7%)	3.99	1.03
12	Computers are fast and efficient means of getting information	20 (5.2%)	26 (6.7%)	23 (6%)	164 (42.5%)	153 (39.6%)	4.04	1.09
13	I do not think I would ever need a computer in my classroom	75 (19.4%)	134 (34.7%)	84 (21.8%)	59 (15.3%)	34 (8.8%)	2.59	1.21
14	Computers can enhance students' learning	22 (5.7%)	39 (10.1%)	33 (8.5%)	178 (46.1%)	114 (29.5%)	3.83	1.12
15	Computers do more harm than good	137 (35.5%)	107 (27.7%)	79 (20.5%)	49 (12.7%)	14 (3.6%)	2.21	1.16
16	I would rather do things by hand than with a computer	114 (29.5%)	140 (36.35)	37 (9.6%)	66 (17.1%)	29 (7.5%)	2.35	1.27
17	If I had the money, I would buy a computer	18 (4.7%)	25 (6.5%)	15 (3.9%)	179 (46.4%)	149 (38.6)	4.07	1.04
18	I would avoid computers as much as possible	108 (28%)	169 (43.8%)	21 (5.4%)	54 (14%)	34 (8.8%)	2.31	1.26
19	I would like to learn more about computers	22 (5.7%)	10 (2.6%)	20 (5.2%)	180 (46.6%)	154 (39.9%)	4.12	1.02
20	I have no intention to use computers in the near future	130 (33.7%)	151 (39.1%)	14 (3.6%)	50 (13%)	41 (10.6%)	2.27	1.33

Table 4.4, clearly shows that 57.8% of the respondents are not scores about computer. While only 36.5% of them were on the negative side. 7.69% of the responders feel grad there are more computer these days leaving only 16.4% who either disagree or strongly disagree with the statement I am glad there are more computers these days. 75.9% of the respondents agree or strongly agree that using computer is enjoyable. Furthermore, as for negative statements I dislike using computer in teaching, 70.2% of the responders disagree or strongly disagree leaving only 12.2% agreeing or strongly agreeing with the statement. In another response to statement computers make me feel uncomfortable, also 79.8% of the respondent either strongly disagree or disagree, while only 15.8% agree or strongly agreed.

As for the affective component of attitude which statement 7-15 tries to measures 80.1% agree or strongly agree with the statement that computer save time and effort while, 16.5% strongly disagree or disagree. 82.1% of the respondent agree or strongly agree that computers are fast and efficient means of getting information with only 11.9% either strongly disagreed or disagree. In another statement computers can enhance students learning, 75.6% of the respondents agreed on strongly agreed or agreed with the statement leaving only 15.8% either strongly disagree or disagreed. As for negative statement “computers do more harm than good”, 63.2% of the respondents strongly disagreed or disagreed, while only 15.8% agreed or strongly disagreed. Similarly in response to a statement learning about computers is a waste of time, 77.2% of the respondents strongly disagreed or disagreed with only 19.7% agreeing or strongly agreed.

As regards to the psycho-motor or behavioral component of attitude which statement 16-20 tries to measure 85% of the respondents agreed or strongly agreed to the statement that if I had money, I would buy a computer, with only 11.2% strongly disagreeing or disagreeing. In other words, majority of the respondents indicated their willingness to buy a computer if they had the financial means of doing so. As for their willingness to learn more about computers 86.5% indicated their readiness by either agreeing or strongly agreeing to the statement that “I would like to learn more about computers” with only 10.3% strongly disagreeing or disagreeing to the statement.

Similarly, 65.8% of the respondents have indicated their willingness to do things by computer rather than by hand, with only 14.65% on the opposite side. Furthermore, 72.8% of the respondents indicated their intention to use computers in the near future with only 23.6% on the other side of the divide. As for the negative statement I would avoid computers as much as possible, 71.8% strongly disagree or disagree, while 22.8% agreed or strongly disagreed with the statement.

From table 4.4 there are indication that senior secondary school teachers in the two states have positive attitude to Information and Communication Technology. From the responses to the items which shows agreement to statement relating to positive attitude range from 86.5% to 52.8% which is considered very high. Such item includes 1,3,5,7,9,11,12,14,17 and 19. These are considered to be high compared to the items with negative statement such as items 2, 4, 6,8,10,13,15,18 and 20 which recorded percentages between 24.1%. This is as a result of the fact that respondents are highly disposed to positive attitude to ICT.

RQ2: What is the Impact of ICT attributes on Attitude of Senior Secondary School Teachers towards the Use of ICT in Teaching?

Table 4.5 Computer Attributes and teachers attitudes

S/N	Items	SD	D	N	A	SA	M	SD
1	Computer will improve education	18 (4.7%)	10 (2.6%)	7 (1.8%)	152 (39.4%)	199 (51.6%)	4.30	.98
2	Teaching with computers offers real advantage over traditional method of instruction	21 (5.4%)	23 (6%)	20 (5.25)	214 (55.4%)	108 (28%)	3.94	1.02
3	Computer technology can not improve the quality of students learning	155 (40.2%)	138 (35.8%)	7 (1.8%)	54 (14%)	32 (8.3%)	2.14	1.30
4	Using computer technology in the classroom will make the subject matter more interesting	14 (3.6%)	40 (10.4%)	11 (2.8%)	192 (49.7%)	129 (33.4%)	3.98	1.05
5	computers are not useful for teaching and learning	142 (36.8%)	164 (42.5%)	24 (6.2%)	38 (9.85)	18 (4.7%)	2.03	1.11
6	Computers has no place in school	184 (47.7%)	124 (32.1%0	34 (8.8%)	36 (9.3%)	8 (2.1%)	1.86	1.05
7	Computers use if it is well into my curriculum goals	16 (4.1%)	32 (8.3%)	77 (19.9%)	204 (52.8%)	57 (14.8%)	3.65	.968
8	Class time is too limited for computer use	23 (6%)	93 (24.1%)	82 (21.2%)	149 (38.6%)	39 (10.1%)	3.22	1.10
9	Computer use suits my students learning preferences and their level of computer knowledge	9 (2.3%)	18 (4.7%)	56 (14.5%)	236 (61.1%)	67 (17.4%)	3.86	.835
10	Computer use is appropriate for many language learning activities	13 (3.4%)	32 (8.3%)	35 (9.1%)	256 (66.3%)	56 (13%)	3.77	.897
11	It will be hard for me to learn to use the computer in teaching	61 (15.8%)	162 (42%)	56 (14.5%)	69 (17.9%)	38 (9.8%)	2.63	1.22
12	I have no difficulty in understanding the basic functions of computer	36 (7.8%)	55 (14.2%)	63 (16.3%)	204 (52.8%)	34 (8.8%)	3.40	1.08
13	Computers complicate my task in the classroom	38 (9.8%)	160 (41.5%)	74 (19.2%)	66 (17.1%)	48 (12.4%)	2.80	1.20
14	Everyone can easily learn to operate a computer	15 (3.9%)	54 (14%)	46 (11.95)	196 (50.8%)	75 (19.4%)	3.67	1.05
15	I have never seen computer at work	197 (51%)	128 (33.2%)	19 (4.95)	27 (7%)	15 (3.9%)	1.79	1.07
16	Computer have proved to be effective learning tools worldwide	13 (3.4%)	23 (6%)	17 (4.4%)	161 (41.7%)	172 (44.6%)	4.18	1.00
17	I have never seen computers being use as educational tools	129 (33.4%)	142 (36.8%)	12 (3.1%)	70 (18.1%)	33 (8.5%)	2.31	1.32
18	I have seen some Nigerian teachers used computer for educational purpose	9 (2.3%)	26 (6.7%)	27 (7%)	223 (57.8%)	101 (26.2%)	3.98	.901

Table 4.5 shows respondents views as regard to computer attributes scale. It should be noted that this scale comprised four other sub-scale, thus of (i) relative

advantage (ii) compatible with existing practices (iii) is not complex to understand or use and (iv) shows observable results. Thus items 1-5 measures relative advantage.

The table shows that 91. % of the respondents agreed that computer will improve education with as few or low as 7.3% disagreeing. In addition, 83.4% were of the view that teaching with computers offers real advantage over traditional method of instruction, while only 10.4 on the other side. Furthermore, 83.1% viewed that using computer technology in the classroom will make subject matter more interesting with 14% viewing otherwise. As for negative statements: computer technology cannot improve the qualities of student learning 76 % of the respondents strongly disagree or disagree with the statement, with 22.3% agreeing or strongly agreed. Similarly, when asked computers are not useful for teaching and learning, 79.3% of the respondents strongly disagree or disagree with the statement, with 14.5% strongly agreed or agreed.

As regards to compatible with existing practice which items 6-10 tries to measures, table above shows that 79.3% of the respondents strongly agreed or agreed that computer use is appropriate for many teaching/learning activities, with only 11.7% strongly disagreed or disagreed. In addition, 78.5% viewed that computer suits students learning preference, while only 7.0 are in disagreement. Similarly, 67.6% of the respondents agreed that computers use fits their curriculum goals, with 12.4% in disagreement. As for negative statements, 79.8% indicated their disagreement with the statement that computer has no place in the school, while only 11.4% are in agreement.

For the complexity of a computer which makes it easy to understand and use, 61.6% of the respondents indicated that they have no difficulty in understanding the basic functions of computers, with only 22% in disagreement. This is further supported by another statement that everyone can learn to operate a computer, 70.2% were in agreement with 17.9% in disagreement. As for the negative statement that it will be hard for me to learn to use computer in teaching, 58.8% indicated their disagreement, while 27.7% were in agreement.

The observable results, 86.3% of the respondents indicated their agreement that computers have proved to be effective learning tools worldwide, while 9.4% are in

disagreement. Related to this 84% of them claimed to have seen some Nigerian teachers using computers for educational purpose, with 9% claiming not. From table 4.5 there are indications that senior secondary school teachers had considered ICT to have relative advantage over previous innovation. This can be seen from the responses to the items which show agreement relating to it with percentage ranging from 91% to 76% for positive statements. Such items include 1, 2, & 4. These items are considered to be high compared to the items with negative statements such as items 3 & 5 which recorded percentage ranking between 22.3 to 14.5%.

As regards to the compatibility with existing practices, there are indications that ICT is compatible with existing practices. This can be seen from responses to the items which show agreement relating to it with percentage ranking between 79.3 to 67.6% for positive statements. Such items include 7, 9, & 10. These items are considered to be high compared to items with negative statements such as items 6 & 8 which recorded percentage ranking between 11.4 to 7.0%.

Furthermore, there are indications that computers are not complex to understand. This can be seen from responses to items which show agreement with percentage ranking between 70.2 to 61.6% for positive statements. Such items are 12 & 14. These items are considered to be high compared with items with negative statements such as 11 & 13 which recorded percentage ranking between 29.5 to 27.7%. Similarly, there are indications that computers show observable results. This can be seen from responses to the items which show agreement to positive statements such as items 16 & 18 with a percentage ranking ranging between 86.5 to 84.0%. These are considered to be high compared to negative statements such as 15 & 17 which recorded percentage ranking between 26.6 to 10.9%.

RQ 3:What are the competences of Senior Secondary School Teachers in the utilization of Information and Communication Technology (ICT) in teaching in Kano and Jigawa States

Table 4.6
Teachers Competences on Information and Communication Technology (ICT)

S/N	Items	SD	D	N	A	M	SD
1	Install new software on a computer	157 (40.7%)	99 (25.6%)	79 (20.5%)	41 (13.2%)	2.06	1.06
2	Use a printer	133 (34.5%)	98 (25.4%)	98 (25.4%)	57 (14.8%)	2.20	1.07
3	Use a computer keyboard	107 (27.9%)	101 (26.2%)	79 (20.5%)	99 (25.6%)	2.44	1.14
4	Operate a word processing programme (e.g., Word	36 (9.3%)	163 (42.2%)	1396 (33.7%)	57 (14.8%)	2.53	.855
5	Operate Presentation programme (e.g. Power point)	131 (33.9%)	122 (31.6%)	84 (21.8%)	49 (12.7%)	2.13	1.02
6	Operate a Spreadsheet programme (e.g. Excel)	121 (31.3%)	135 (35%)	77 (19.9%)	53 (13.7%)	2.16	1.01
7	Operate a Database programme (e.g. Access)	74 (19.2%)	108 (28%)	94 (24.4%)	110 (28.5%)	2.62	1.09
8	Use internet for communication (e. g. email & Chat room)	32 (8.3%)	98 (25.4%)	116 (30.1%)	140 (36.3%)	2.94	.973
9	Use World Wide Web to access different type of information	31 (8%)	69 (17.9%)	124 (32.1%)	162 (42%)	3.08	.956
10	Solve simple problem in operating computers	75 (19.4%)	016 (27.5%)	99 (25.6%)	106 (27.5%)	2.61	1.08
11	Operate a Graphics programme (e.g. Photoshop)	84 (21.8%)	97 (25.1%)	89 (23.1%)	116 (30.1%)	2.61	1.12
12	Use computers for grade keeping	55 (14.2%)	117 (30.3%)	109 (28.2%)	105 (27.2%)	2.68	1.02
13	Select and evaluate educational Software	81 (21%)	125 (32.4%)	86 (22.3%)	94 (24.4%)	2.50	1.07
14	Create and organise computer files and folders	38 (9.8%)	82 (21.2%)	91 (23.6%)	175 (45.3%)	3.04	1.02
15	Remove computer virus	123 (31.9%)	68 (17.6%)	74 (19.2%)	121 (31.3%)	2.50	1.23

Table 4.6 demonstrated that there are indications that senior secondary school teachers in the two States have low competencies to handle ICT facilities. This can be seen from responses to items that recorded percentage ranking between 66.4 to 55.5% showing little or no competences which are considered high. Such items include 1, 2, 3, 4, 5, 6, 7, 11, 13, &14. However, it should be noted that there are indications that their skills in internet browsing, chatting, and rooming is high compared to power point, excel graphic, as responses on items 8, 9, 12 & 15 ranging from percentage ranking between 74.1 to 50.5% on moderate competence and much competence.

RQ 4: To what Extent does Senior Secondary School Teachers have Access to Information and Communication Technology (ICT) Facilities in the States?

Table 4.7

Access to Information and Communication Technology (ICT) facilities

S/N	Items	Daily	2-3 Times a week	Once a week	Once a month	Never
1	Use computers in your home	199 (51.6%)	52 (13.5%)	36 (9.3%)	20 (5.2%)	79 (20.5%)
2	use computer at school (Computer Lab. or library)	74 (19.2%)	122 (31.6%)	59 (15.4)	40 (10.4%)	91 (23.6%)
3	Use computer at other places (like internet cafes e.t.c.)	43 (11.1%)	54 (14%)	131 (33.9%)	72 (18.7%)	86 (22.3%)

Table 4.7 shows respondents' access to computer was low as only 11.1% having access to computer at home on daily basis, 19.2% have at school and 51.6% have access to computers at internet café. Similarly, also 14% have access to computers at home 2 or 3 times a week, 34.6% at school and 13.5% at internet cafe and other places.

As for computer access on weekly basis, it was found that 33,9% at home, 15.3% at school and 9.3% at internet café and other places. On monthly basis however, 18.7% have access at home , 10.4% at school, and 5.2% at internet café and other places. It was

also indicated that 23.6% never have access to computers at school, 22.5% at home, and 20.5% at internet and other places.

The finding revealed that senior secondary school teachers in the States have access to computers as 79.5% of them can access computers at internet café and other places compared to 20.5% who do have access. At home, 77.7% have access to computers from daily to once in a month compared to 22.3% of never. At school, 76.5% can access computers from daily basis to once in a month compared to 23.6% of those that never.

RQ 5: Is there any relationship between ICT attribute and teachers attitudes toward the utilization of ICT in teaching in Kano and Jigawa States?

Table 4.8 Relationship between teachers' attitudes to ICT and ICT attributes

	Mean	Std. Deviation	N	df	R	Prob
Attitude towards ICT in Teaching	67.4519	10.43152	386			
				384	0.786	0.000*
Effect of Attribute on Attitude of Teachers towards Using ICT in teaching	59.4011	7.18388	386			

(N= 386, df=384, $p<0.05$, $r\text{-}_{calc}= 0.786$, $r\text{-}_{critical}=$) Key * significant at 0.05.

The result of the Pearson Product Moment Correlation Coefficient (PPMC) in table 4.8 indicated a correlation coefficient of 0.786 signifying that there was indeed a strong relationship between teachers' attitude toward the utilization of ICT in teaching and ICT attributes. The null hypothesis is hereby rejected.

Table 4.8 indicates that there is relationship between Computer Attitude and Computer Attribute of Teachers towards Using ICT in teaching in Senior Secondary School in Kano and Jigawa States as r=0.786. Teachers' attitude towards ICT in teaching has the mean of 67.4519, Standard Deviation of 10.43152. Also, effect of Attribute on Attitude of Teachers towards Using ICT in teaching has the mean of 59.4011, Standard

Deviation of 7.18388. This implies that there is indeed a strong relationship in the stated objective which stated that there is Relationship between Computer Attitude and Computer Attribute of Teachers towards Using ICT in teaching in Senior Secondary Schools in Kano and Jigawa States. The null hypothesis was rejected.

RQ 6: Is there any significant relationship between teachers' competencies in the utilization of ICT in teaching and their attitudes toward the use of ICT in teaching?

In order to answer this question the null hypothesis was formulated: there is no significant relationship between teachers' competencies in the utilization of ICT and their attitudes toward the use of ICT in teaching.

Table 4.9 Relationship between teachers' attitudes towards the use of ICT in teaching and teachers competencies in the utilization of ICT.

	Mean	Std. Deviation	N	Df	r	Prob
Attitude towards ICT in Teaching	67.4519	10.43152	386			
Effect of Computer Competence on Attitude of Teachers towards Using ICT in teaching	19.1631	2.17701	386	384	-0.677	0.000

(N= 386, df=384, $p<0.05$, $r\text{-}_{calc}$= -0.677, $r\text{-}_{critical}$=) Key not significant at 0.05.

The result of the Pearson Product Moment Correlation Coefficient (PPMC) in table 4.9 indicated a correlation coefficient of -0.677 signifying that there was indeed no significant relationship between teachers' attitudes toward the use of ICT in teaching and teachers competencies in the utilization of ICT in teaching. The null hypothesis was retained.

The table indicates that there is relationship between Computer Attitude and Computer Competence of Teachers towards Using ICT in teaching in Senior Secondary Schools in Kano and Jigawa States, as r=0.677. Attitude towards ICT in Teaching has the mean of 67.4519, Standard Deviation of 10.43152. Also, Effect of Computer Competence

on Attitude of Teachers towards Using ICT in teaching has the mean of 19.1631, Standard Deviation of 2.17701. This implies that indeed there is no relationship between teachers' attitudes towards use of ICT in Teaching and teachers competencies in the utilization of ICT in teaching. The null hypothesis was retained.

RQ 7; Is there any significant relationship between teachers' access to ICT facilities and their competencies in the utilization of ICT in teaching?

In order to answer this question, the null hypothesis was formulated: there is no significant relationship between teachers' competencies in the utilization of ICT and their access to ICT facilities.

Table 4.10 Relationship between teachers' competencies in the utilization of ICT in teaching and teachers access to ICT facilities.

	Mean	SD	N	Df	R	P. Value
Ict competencies of teachers in the of Utilization of ICT in Teaching	19.1631	2.17701	386	385	0.774	0.000*
Teachers Access to ICT facilities	12.7567	0.75896	386			

(N= 386, df=384, $p<0.05$, $r\text{-}_{calc}= 0.774$, $r\text{-}_{critical}=$) Key * significant at 0.05.

The result of the Pearson Product Moment Correlation Coefficient (PPMC) in table 4.10 indicated a correlation coefficient of 0.774 signifying that there was indeed significant relationship between teachers' access to ICT facilities and their competencies in the utilization of ICT in teaching. The null hypothesis was rejected.

From the table above, r=0.774, teachers' competencies in the utilization of ICT in teaching has mean of 19.1631, Standard Deviation of 2.17701. Teachers' access to ICT facilities has mean of 12.7567, standard deviation of 0.75896. This implied that there is a strong relationship between teachers' competencies in the utilization of ICT in teaching and teachers' access to ICT facilities. The null hypothesis was rejected.

4.4 Summary of the Major Findings

Major findings of this study are summarized as follows:

1. Senior secondary school teachers in Kano and Jigawa States have positive and favourable attitude toward the utilization of ICT in teaching. This have demonstrated in responses to items which shows agreement to statements relating to positive attitude which range from 85.5% - 52.8%. These are considered high
2. Computer attributes (relative advantage, compatibility with existing practices, not complex and understand and easy to use, and show observable results) had affected the attitude of senior secondary school teachers toward the utilization of ICT in teaching in Kano and Jigawa States. Responses on relative advantage range from 70.8% -58.8%, compatibility with existing practices 79.3% - 67.6%, not complex to understand and easy to use 91% -83.1%, and, show observable results 86.3 – 84%
3. Finding of this study shows low competences level on the utilization of ICT in teaching by senior secondary school teachers in Kano and Jigawa States. This can be seen from responses to items that recorded percentage ranking between 64.4 – 55.5% showing little or no competences. This is considered high
4. The study found out that there was low access to Computers by senior secondary school teachers in Kano and Jigawa States. This can be seen from responses indicating computer access with 19.2 – 14% who had access at school and home respectively
5. Finding from the study indicated a strong relationship between computer attributes and teachers attitude toward the utilization of ICT in teaching. The result of the

PPMC indicated a correlation coefficient of 0.786 at 0.05 signifying a significant relationship. The null hypothesis was rejected

6. Finding of this study indicated no significant relationship between teachers competences in the utilization of ICT in teaching and their attitude towards the utilization of ICT in teaching. The result of the PPMC indicated a correlation coefficient of 0.677 at 0.05 signifying no significant relationship. The null hypothesis was retained
7. The finding revealed a strong relationship between teachers' competences in the utilization of ICT in teaching and their access to ICT facilities (computers). The result of the PPMC indicated a correlation coefficient of 0.774 at 0.05 signifying a significant relationship. The null hypothesis was retained.

4.5 Discussions

This study examined the Senior Secondary School Teachers Attitude, competencies and access on the utilization of Information and Communication Technology (ICT) in teaching in Kano and Jigawa States. A total of 386 teachers from 35 Government Senior Secondary Schools participated in the study. With varying educational levels, gender and years of teaching experience, the majority of the respondents have been working for over 5 years in the schools studied. This implies that teachers were already conversant with the various ICT facilities in the schools and were therefore expected to reveal their respective attitudes, competencies and access and its effect on the utilization of ICT towards exercising their duty of teaching as teachers in the study area. Consequently, some of the findings agree with the conceptual framework that was developed to guide the study while others do not. In all however, the study found that

all of the variables measured including attitudes, attribute, competencies and access had impacted on Senior secondary school teachers use of Information and Communication Technology (ICT) in teaching.

Below, discussions of research findings of the study are hence presented in line with the specific objectives of the study.

Research findings on teachers' attitude revealed that teachers in senior secondary schools have positive attitude towards the use of Information and Communication Technology in teaching as it was found that majority of the teachers agreed with varying level of agreement with some terms used in measuring computer and its uses such as availability of computers nowadays, using it to teach, computer and time consuming, etc. This as viewed by Myers & Halpin (2002), Yildirim (2000), and Teo (2008) where they believed that attitudes towards computers and other ICT facilities and trust in using them in education are two major predictors for teachers' future use of technology in classrooms. Levin and Wadmany (2006–2007) emphasize the importance of a clear focus on teachers' attitudes, values, and beliefs as a primary focus in supporting teacher learning. A negative attitude may lead to ICT resistance (Sheiderman, 1980), a phenomenon that can be found among experienced as well as inexperienced users (Negron, 1995). A negative attitude may even lead to defamation or sabotage of computer technology (Gibson & Rose, 1986). Gaining an appreciation of the teachers' attitudes towards ICTs use may provide useful insights into technology integration, and acceptance as well as usage of technology in teaching and learning.

Furthermore, the finding is in line with the study of Aiken (1996) where he conceptualizes an attitude as a "learned predisposition to respond positively to certain objects, situations, institutions, concepts or persons." As implied in this definition, attitudes possess cognitive (beliefs, knowledge, and expectations), affective (motivational and emotional), and performance (behavior or actions) components. A person's attitude toward ICT is influenced by a variety of aspects, e.g., computer liking, computer confidence, computer anxiety or comfort (Delcourt & Kinzie, 1993), achievement (Bandalos & Benson, 1990), usefulness, and value (Pelton & Pelton, 1996), age and gender (Colley & Comber, 2003; Kutluca, 2010), subject area and years of computer use (Teo, 2008), levels of technology use in classrooms (Al-Zaidiyeen et al., 2010) and self-efficacy (Rovai & Childress, 2002).

In agreement also, Chen and Chang (2006) indicates that attitudes, skills, and practice are interrelated variables. Their results also suggest that aspects of teacher technology competence vary according to number of teaching years, home computer access, and length of in-service training. In most cases, many of these factors interact with one another to impact on attitudes towards ICTs. However, the effect of gender on the formation of a person's ICT usage attitudes is still a matter of debate and research findings are inconsistent. Previously, several studies have addressed this factor and revealed that males have a more positive attitude towards ICTs compared to females (Krendl 1989; Loyd 1987).

On the contrary, Barrier and Margavio's study (1992) showed that males attitude towards ICT was more negative than that of females. Surprisingly, Yildirim's study (2010) which investigated 120 pre-service teachers' attitude towards ICT showed no

gender differences in attitude. Kay (1990) has stated that gender-related studies have produced conflicting results. Thus, understanding gender-based attitudinal difference is likely to have an important implication.

The relationship between years of teaching experience and ICT attitude has not been given much consideration. In the African context, the only study (Sadik, 2006) proved that more experienced teachers shows more positive attitudes towards ICTs. Accordingly, the researcher believes that there is a need for more studies to explore the relationship between years of teaching experience and attitudes towards computers.

More specifically, there are several studies conducted in Cameroon (Blankenship, 1998) Ghana (Andoh, 2012), Egypt,(Al-Khatib, 2000) Syria and other countries in the region investigating the attitudes of teachers towards ICTs in schools. These studies may provide useful findings for better understanding of the situation in Nigeria.

Abdulkafi (2006) explored the attitude of high school English as Foreign Language (EFL) teachers in Syria toward ICT and investigated the relationship between computer attitude and five independent variables: computer attributes, cultural perceptions, computer competence, computer access, and personal characteristics (including computer training background). The findings suggest that teachers have positive attitude towards ICT in education and their attitudes were predicted by computer attributes, cultural perceptions, and computer competence. Moreover, the results clearly emphasized the importance of teachers' vision of technology itself, their experience in using it, and the cultural conditions surrounding its introduction into schools, on shaping

teachers' general attitude towards technology and its subsequent diffusion in their educational practice.

Saracaloglu.(2010) analyzed the attitude of 419 candidate teachers towards ICT in terms of various variables. Data were collected through two data gathering instruments. The study revealed that attitude of teachers towards ICT was "very positive".

Al-Zaidiyeen, Mei, & Fook (2010) investigated the level of ICT use for educational purposes by teachers in Jordanian rural secondary schools; the study demonstrated the importance of teachers' attitude towards the use of ICT for educational purposes. A questionnaire was used for data collection and it was distributed among 650 teachers in Jordan. The survey included questions concerning the level of ICT use as well as questions related to the attitude of teachers towards the use of ICT. The findings revealed that teachers' level of ICT use for educational purpose was low although their attitude towards the ICT use was positive.

In agreement also, Cavas et al. (2010) study explored Turkish primary science teachers' attitudes towards ICT in education and (then) the relationship between teachers' attitudes and the factors related to teachers' personal characteristics (gender, age, computer ownership at home, and computer experience). The instrument (STATICTE) was developed by researchers and administered to 1071 science teachers. The results indicated that the Turkish science teachers have positive attitudes toward ICT; no gender differences have been traced in their attitudes towards ICT but differences were found in

terms of their age, their computer skills (experience) and their ownership of computers at home.

In addition, the research findings reveals that Senior Secondary School Teachers Attributes have positive impact on their attitudes towards the use of Information and Communication Technology in teaching. Factors of attributes such as experience, knowledge, generative learning, etc were used to measure teachers attribute. In agreement therefore, the study agrees with the study of Asan, (2002); Braak, (2001); Jenson, Lewis, & Smith, (2002); Zhao & Cziko, (2001), Sahin & Thompson, (2006) where they found out that "ICT experience" has been found as an important factor for influencing teachers' instructional ICT use. Teachers ICT knowledge and experience are especially important for effective usage of ICT in their classroom. Because, generative learning begins at the knowledge stage of diffusion, which is the first stage (Rogers, 1983).

According to Loyd & Gressard (1986), positive attitudes towards computers are positively correlated with teachers' extent of experience with computer technology (cited in Christensen, 2002). This result could be anticipated due to the importance placed on the use of technology in all parts of our life. Several studies conducted in other countries also found similar findings about attribute on attitude towards ICT in education (Albirini, 2006; Sadik, 2006; Samak, 2006; Yunus, 2007).

In agreement also, positive correlations have been shown between various ICT experiences and attitudes (Dupagne & Krendel, 1992; Levine & Donitsa-Schmidt 1998; Winter, Chudoba & Gutek, 1998; Smith, Caputi & Rawstorne, 2000; Yıldırım, 2000; Gaudron & Vignoli 2002).In their study, specific emphasis was laid on computer as ICT where they revealed that computers can play important role to reduce computer anxiety

which is seen as a teacher resistance to integrate ICT in teaching and learning environment. Yang, Mohamed, & Beyerbach (1999) searched the relationship among computer experience and various demographic variables, specifically learning style, age, gender, ethnicity/culture, subject area, educational level, and type of school. They found that teachers' negative attitudes towards computers change after receiving formal training about computer use (Dupagne & Krendel, 1992; Koohang, 1987).

In general, the literature by Rogers (1995) points to a positive relationship between teachers' attitudes toward ICT and their perceptions of computer attributes. Teachers who perceive computers as advantageous, compatible with their current practices, easy to use, and observable usually have positive attitudes toward ICT in education.

Furthermore, the answered study objective found out that cultural perception has positive effect on Attitude of teachers towards Using ICT in teaching. To start with, Harper (1987) contends that cultural factors play an important role in creating negative attitudes toward computers: "One direct cultural cause is people's apprehension that life is becoming too mechanized, so they resist contributing to a "computer culture". Another cause is the concern that there are other social problems that need to be solved before computer-education is addressed...".

Martinez (1999), among others, suggests that one of the major challenges facing developing countries is to make technology an essential part of the culture of the people. Similarly, Roblyer, Dozier-Henry and Burnette (1996) suggests that the reverence with which technology is held in a country like the US may be in contradiction to the

perceptions of cultures that are relationship-oriented. On the same grounds, Zhuang & Thomas (1987) argue:

> *An important reason for the frequent disappointing results in transferring a technology from one culture to another is that the decision-makers who engage in the transfer lack sufficient knowledge of either the importers' cultural conditions or the nature of the technology or both.*

In addition, the micro culture of a certain institution or organization may inhibit the diffusion of technologies and the changes they entail. For a new technology to be placed into an organization's culture, there must be a match of organizational and technological values (Hodas, 1993). Within the school organization, if the technology is not received well by teachers, there must be a mismatch of values between the culture of schools and the technology.

This affirms Bowers' (1998) apprehension over the global unawareness about the cultural non-neutrality of ICT. As Bowers puts it, "…neither the computer industry nor educational policy makers understand the cultural mediating characteristics of computers". Unfortunately, people from different countries have often accepted technological innovations as neutral tools (De Castell et al., 2002). De Castell et al. cite Penley and Ross (1991) arguing:

> *We fully recognize that cultural technologies are far from neutral and that they are the result of social processes and power relations. Like all technologies, they are ultimately developed in the interests of industrial and corporate profits, and seldom in the name of greater community participation or creative autonomy*

Worth noting at this point is that the research findings of this work is consistent with other research studies that were carried out in various countries (Felton, 2006; Gurr, 2000; Knowledge Foundation, 2003; NetDay, 2008).

Previous research has pointed to teachers' lack of computer competence and skills as a main barrier to their acceptance and adoption of ICT in developing countries (Pelgrum, 2001; Al-Oteawi, 2002; Na, 1993). The result of the current study showed that computer competences and skills by Senior Secondary School Teachers have positive impact towards its use in teaching.

This enthusiasm for developing computer skills seems to be common among teachers in different parts of the world nowadays (e.g., Demetroadis et al. 2003; Pelgrum, 2001; Al-Oteawi, 2002). Such feelings are anticipated since teachers believe that ICT enhances the quality of teaching.

This result is in compliance with the findings of Na (1993), Summers (1990), and Al-Oteawi (2002). In this study, computer competence was the third most significant predictor of teachers' attitudes toward ICT in education—a finding that supports the theoretical and empirical arguments made for the importance of computer competence in determining teachers' attitudes toward ICT (Harrison & Rainer, 1992; Bulkeley, 1993; Berner, 2003). The findings, however, did not support the assumption that teachers with low level of computer competence usually have negative attitudes toward computers (Summers, 1990). The relationship between computer attitudes and competence suggests that higher computer competence may foster the already positive attitudes of teachers and eventually result in their use of computers in the classroom.

In agreement also, Pelgrum (2001) in his multinational study that involved teachers from 26 countries found that teachers' lack of knowledge and skills was the second most inhibiting obstacle to the use of computers in schools. In their analysis of several major cross-cultural studies completed during the 1990s and related to

information technology and education, Knezek and Christensen (2002) found that teachers' competence with computer technology is the principal determinant of effective classroom use by students. Isleem (2003) found that computers expertise (competence) was the strongest predictor of computer use by Ohioan technology education teachers.

However, computer competence do not always account for positive attitudes toward computers. Sometimes, teachers report positive attitudes toward computers but indicate that they lack the competence necessary for using them effectively in the classroom (Grasty, 1986, cited in Na, 1993). That is partly why some studies did not find any significant relationship between teachers' attitude and competence (e.g., Hendricks, 1998). Overall, a number of studies showed that teachers' computer competence team up with attitudes in determining both the initial acceptance of computer technology as well as future behavior regarding computer usage (Francis-Pelton & Pelton, 1996; Harrison & Rainer, 1992).

In addition, the study found that Senior Secondary School Teachers in Kano and Jigawa state have access to Information and Communication Technology. Access according to Marshall and Ruohonen, (1998), access to computer resources has often been one of the most important barriers for the integration of technology in both developed and developing countries.

Research in developing countries has shown that, while computers were supplied for students' use, almost none were available specifically for teachers' use (Abas, 1995). Reporting on her study in Malaysian schools, Abas (1995) suggests that access to computers in different location may help create what she calls "a computer using culture"

among teachers. Pelgrum (2001) found that computer unavailability/insufficiency was the main obstacle to computer use by teachers from 26 different countries.

Most studies examined computer attitudes have reported a significant correlation between computer access and attitudes toward computers (Marsshall and Ruohonen, 1998; Pelgrum, 2001; Na, 1993). In his study of Korean teachers, Na (1993) found a positive correlation between teachers' attitudes toward computers and computer ownership, accessibility to school computers, the level of accessibility to school computers, and number of computer locations in the school. Na concluded that there was a significant relationship between the proximity of computers and the number of access resources (home and school) on the one hand, and, on the other, teachers' attitudes toward computers. Knezek and Christensen (2002) found that teachers' access to technology tools has a major impact on the quality of computer use on the part of the teachers. Knezek and Christensen's conclusion has been widely supported by studies on the use of computers in education (e.g., Isleem, 2003; Blankenship, 1998).

In a fewer number of studies, however, access to computers did not correlate with teachers' attitudes toward ICT. For examples, Watson (1998) reported of teachers resisting the very existence of computers in the educational milieu. Rockman (2000) argued:

> *If schools have access to the Internet and there are computers in reasonable numbers, we also need to know that the teachers are prepared, that the technology is maintained and in working order, and that the appropriate software is available. Further, we must also have a culture that encourages and supports the use of technology for teaching and learning.*

In agreement also, Van Weert (1998) revealed in his study that access is important only when other conditions are met in the process of technology implementation in

schools and hence the results of technology implementation are “independent of any computer platform or software environment".

Based on the study findings presented in this objective, therefore, it can be concluded that attitudes, attributes, cultural perception, competence, skills and access all interplay and have a positive impact on the use of ICT by Senior secondary school teachers in the study area.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presented the summary of the entire work, conclusions and recommendations

5.2 Summary

The study investigated senior secondary school teachers' attitudes, competencies and access on the utilization of Information and Communication Technology in teaching in Kano and Jigawa States, Nigeria. It examined attitudes as a combination and influence of so many variables such as attributes of an innovation (ICT), competences, as well as access to ICT facilities. The findings was based on teachers attitudes to ICT, Computer attributes and its' relationship with attitudes, ICT Computer competencies and its' relationship to attitudes, as well as computer access to ICT and its' relationship with Computer Competencies. Seven research questions were formulated to guide the study. An adopted questionnaire Albirini (2005) teachers attitudes to Information and Communication Technology was administered to 386 sampled secondary school teachers randomly selected from the two States. A survey research design was adopted so that generalization can be implied on the findings.

5.3 Conclusion

5:3:1 Findings of the Study

Results of the findings of the study indicated that three components of an attitudes measured in this study have positive results. This can be seen from responses to items which show agreement to statement relating to positive attitude ranging from 86.5 to 52.8%. Such items include 1, 3, 5, 7, 9, 11, 12, 14, 17, & 19. These are considered high compared to items with negative statement such as items 2, 4, 6, 8, 10, 13, 15, 18, & 20 which recorded percentage ranking between 24.1 to 7.1%.

In the area of Computer attributes, four areas were tested, they are relative advantage of Computer over existing practice, case of use, compatibility of Computer with existing practice, and that of observable results. This is in support of Rogers (1995) diffusion of innovation models who opined that characteristics of an innovation (in this case computer) influence its acceptance or rejection. The respondents' scores in all the four areas were high. Rogers' premise concerning individuals shift from knowleged about technology to forming attitudes towards it and then to its adoption or rejection corroborates the general and widely accepted belief that attitudes affect behavior directly or indirectly (Ajzen & Fishbein, 1980, Zimbardo, Ebbesen, & Maslah, 1977). The findings of this study collaborate Rogers & Shoemaker (1979) who found that relative advantage, compatibility and observability are positively related to adoption. Sooknanan (200) also found that relative advantage, compatibility, and observability were significantly related to teachers' attitudes toward computer.

Findings on Computer competencies and skill indicated that teachers have low computer skill and competence. This can be seen from responses to items showing little or no competent with a percentage ranking between 64.4% to 55.5%. These items 1,2,3,4,5,6,7,11,& 14. These are considerd high compared to items which shows much competence that recorded percentage ranking between 42.0 to 12.7% these items include 8,9,10,12, 13 & 15. This is in agreement with finding of Grasty, (1986) as cited by Na, (1993) that computer competence do not always account for positive attitude toward computers. Sometime teachers report positive attitude toward computers but indicate that they lack competence necessary for using them effectively in the classroom. That is partly why some studies (including this) did not find any significance relationship between teachers attitude and competence (e.g. Hedricks, 1998). The findings however, did not support the assumption that teachers with low level of computer competence usually have negative attitudes toward computers.

As for computer access the research sought to find out the extent to which Senior Secondary School Teachers have access to Computers at home, School and Other places (Internet Café) on daily, twice/trice a week, weekly, Monthly, and never. The findings revealed that their computer access was high. The respondents indicated that 79.5% of them can access Computer at internet Café and other places compared to 20.5% who doesn't have access. 77.7% have access to computers at home compared to 22.2% of never. In addition, 76.5% have access in the school compared to 23.6% of those that never had. Significantly therefore, the major source of Computer access is the Internet, their respective home and lastly the school. These may be the reason why their skill in the World Wide Web to access different types of Information, Communicatiob using email

And chat room was high compared to other uses of computer for educational purposes such as poer point, Excel, Grade keeping etc. Studies that reported a significant correlation between Computer access and attitudes toward Computers include Marshall & Ruohonen, (1998), Pelgrum, (2001), Na, (1993), Knezek & Christensen, (2002), and Isleem, (2003). Few studies however, found that access to computers did not correlate with teachers attitudes toward ICT e.g Watson, (1998), and Rockman, (2002).

5.3.2 Implication of the Findings.

Based on the findings of this study, the following implications can be drawn. The eclectic nature of the instrument provided for the cross-matching of variables appropriately. This implied that the results of the findings of one variable help determine the relationship of one variable with the other.

With the positive attitudes of teachers toward ICT they can utilize ICT in School and Classroom activities, since positive attitude of teachers have been shown in the literature to influence their acceptance of ICT and its subsequent utilization in teaching.

Findings on Computer attributes as it affect and influence attitude was also positive. This implied that ICT has relative advantages over existing practices, it is easy to use, it is not complex to understand, and shows observable results. It acceptance by potential adapting units is guaranteed (Rogers 1995).

Majority of the teachers have low competences to successfully integrate and utilize ICT facilities in their teaching. This implied that their availability in the schools does not guarantee its utilization in teaching. Therefore teachers need to be train and

retrain on the use of computers (ICT) in teaching, learning and other school and class room activities.

The limitation of the study to Kano and Jigawa states in scope make the findings descriptive and generalization to the whole of Nigeria or even Northwest Geographical zone difficult. Therefore, attitudes of teachers toward ICT in Nigerian secondary schools need to be considered with care.

The research data were collected using an adapted questionnaire which was open to respondents' bias, self – reporting in such questionnaire cannot be taken as the truth of the situation, only observation could reveal teachers skill and competency level and access. In view of these, findings on computer access, skill and competencies were best self – efficacy reports, which may indicate true state or otherwise of the findings.

5.4 Recommendations

Based on the findings of this research and the purposes outlined in chapter one the following recommendations are made.

5.4.1 Recommendations from the study

Based on the findings of this research and the significance of the study outlined in chapter one, the following recommendations are hereby made.

1. Teachers, being the bedrock upon which the development of any nation should avail themselves of the opportunity provided by ICT for interactive and students centered teaching whereby students would no longer be passive receivers of information, but active participants in teaching and learning processes,

2. Competency in the use of ICT is an issue that requires constant practice and access to necessary tools and facilities. Teachers are therefore, encouraged to perform as many tasks as possible with the use of computer so as to increase their level of competency in the use of computers. This can be through seminars, workshops, and train the trainers' conferences.

The Digital Bridge Institute Established by The Federal Government of Nigeria provides for such training on request of the relevant ministries and agencies at both states and Federal levels.

3. School authority or ministries of education to provide for training and capacity building for teacher on ICT.

4. Teacher training institution, College of education both State and federal, institute of education in the Universities, Departments of education in the universities, National Teachers institute (NTI) to review their curriculum to incorporate ICT usage with special emphasis on the use of computer in teaching, learning, research, and school administration as a major component of their teacher training programmes.

5. Adequate provision of computers should be made in all schools in the States to increase teachers' access to computer. If possible, the governments can enter into a bilateral agreement with donor organization at both national and international level to provide laptops to all senior secondary school teachers in the state. This is with a view to increasing access, and consequently improve knowledge, skills and competencies in ICT.

6. One of the major challenges facing the application, utilization and integration of ICT in teaching, Learning, research and school Administration in Nigeria is power

supply. Adequate, effective and efficient power supply even if it is within normal school hours should be provided in all senior secondary school in the two States.

7. Teachers condition of service should be improved so as to motivate them. There numbers should be increased and their retention and their productivity should be a matter of concern to all school administrators in the two states.

5.4.2. Recommendation for further Research

In view of the variables used in this study, the following recommendations for further research w made:

1. This study was limited to Kano and Jigawa State, Nigeria; other researchers are encouraged to carry out the same in other states of Nigeria. There may be need for curriculum Development Bodies-NCCE, NTI, NERDC, NUC; etc. to sponsor similar study nationally, the practice in America and other advance countries in the world is that philanthropist, NGO, and other governmental organizations sponsor such research so as to provide useful data for policy makers to successfully integrate education innovations and changes.
2. The present study was limited to State public senior secondary schools teachers in Kano and Jigawa; it is therefore recommended that such study can also be carried out in federal owned and private secondary schools in other States of Nigeria.
3. It is also suggested that research can be carried out to compare teachers' characteristics (gender, educational qualification teaching experience, etc) with variable of this research.

4. It is also suggested that similar research be carried out on tertiary education lecturers. This is because application and utilization of ICT does not limit itself to secondary schools alone.
5. The eclectic nature of the instrument provides an opportunity for cross examination of variable, other researchers who have interest are also recommended to adapt the instrument for their study.

Contributions to knowledge

1. Investigated teachers' attitudes, competencies and access on utilization of Information and Communication Technology (ICT) in teaching among senior secondary teachers in Kano and Jigawa States – the first of its kind in Nigeria.
2. Teachers' attitudes, ICT attributes, competencies and access have impact on senior secondary school teachers use of Information and Communication Technology (ICT) in teaching
3. Teachers in the Kano and Jigawa States have positive attitude to the use of Information and Communication Technology (ICT) in teaching thereby providing insights into technology integration and acceptance in using technology in teaching/learning
4. The study revealed that senior secondary school teachers in the two States have positive attitudes which enable them to be inclined to use ICT in teaching
5. Teachers in the two States lack the necessary ICT skills to use power point presentation in the classroom
6. The study revealed significant relationship between computer attributes and teachers attitude toward the utilization of ICT in teaching

7. The study revealed that there is no significant relationship between teachers competences in ICT and their attitude towards the utilization of ICT in teaching
8. The study revealed a significant relationship between teachers' competences in ICT and their access to ICT (computer) facilities

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Appendix 11

TEACHERS QUESTIONNAIRE

I am a postgraduate student of Department of Education Bayero University Kano pursuing Ph.D Programme in Curriculum Studies. This questionnaire is meant to solicit your responses on Senior Secondary Teachers Attitude Skills and Utilization of Information and Communication technology in teaching in Kano and Jigawa States. This questionnaire consists of six sections. Each section begins with some directions pertaining to that part only. As you begins each section, please read the directions carefully and provide your responses candidly in the format requested.

All information will be treated as confidential and will be used for research purposes only. Thank and may Allah bless you.

Section 1: Personal Information

Name of the School: _____

Subject you are teaching: _____

Educational Qualifications: (i) B.A (Ed) Bsc. (Ed) B. (Ed) ☐

(ii) Bsc./HND ☐

(iii) N.C.E. ☐

(iv) Diploma ☐

(v) Others (Please Specify)_____

Years of Teaching Experience

(i) 0 – 5 years ☐

(ii) 6 – 10 ☐

(iii) 11 and above ☐

Gender (i) Male ☐ (ii) Female ☐

Section (2) Instructions: Please indicate your reaction to each of the following statements by circling the number that represents your level of agreement or disagreement with it. Make sure to respond to every statement						
		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	Computers do not scare me at all	1	2	3	4	5
2	Computers make me feel uncomfortable	1	2	3	4	5
3	I am glad there are more computers these days	1	2	3	4	5
4	I do not like talking with others about computers	1	2	3	4	5
5	Using computers is enjoyable	1	2	3	4	5
6	I dislike using computers in teaching	1	2	3	4	5
7	Computers save time and effort	1	2	3	4	5
8	Schools would be a better place without computers	1	2	3	4	5
9	Students must use computers in all subject matters	1	2	3	4	5
10	Learning about computers is a waste of time	1	2	3	4	5
11	Computers would motivate students to do more study	1	2	3	4	5
12	Computers are a fast and efficient means of getting information	1	2	3	4	5
13	I do not think I would ever need a computer in my classroom	1	2	3	4	5
14	Computers can enhance students' learning	1	2	3	4	5
15	Computers do more harm than good	1	2	3	4	5

16	I would rather do things by hand than with a computer	1	2	3	4	5
17	If I had the money, I would buy a computer	1	2	3	4	5
18	I would avoid computers as much as possible	1	2	3	4	5
19	I would like to learn more about computers	1	2	3	4	5
20	I have no intention to use computers in the near future	1	2	3	4	5
Section (3) Instructions: Please indicate your reaction to each of the following statements by circling the number that represents your level of agreement or disagreement with it. Make sure to respond to every statement						
		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	Computers will improve education	1	2	3	4	5
2	Teaching with Computers offers real advantages over traditional methods of instruction.	1	2	3	4	5
3	Computer Technology cannot improve the quality of students' Learning	1	2	3	4	5
4	Using Computer Technology in the Classroom would make the subject matter more interesting.	1	2	3	4	5
5	Computers are no useful for teaching and learning	1	2	3	4	5
6	Computers have no place in schools	1	2	3	4	5
7	Computer use fits well into my Curriculum goals	1	2	3	4	5
8	Class time is too limited for computer use	1	2	3	4	5

9	Computer use suits my students' learning preferences and their level of computer knowledge	1	2	3	4	5
10	Computer use is appropriate for many learning activities	1	2	3	4	5
11	It would be hard for me to learn to use the computer in teaching.	1	2	3	4	5
12	I have no difficulty in understanding the basic functions of computers	1	2	3	4	5
13	Computers do complicate my task in the classroom	1	2	3	4	5
14	Everyone can easily learn to operate a computer	1	2	3	4	5
15	I have never seen computer at work	1	2	3	4	5
16	Computer have proved to be effective learning tools worldwide	1	2	3	4	5
17	I have never seen computers being used as an educational tool	1	2	3	4	5
18	I have seen some Nigeria teachers use computer for educational purpose	1	2	3	4	5

Section (4) Instructions: Please indicate your current computer competence level (i.e. both your knowledge of and your skill in using computers) regarding each of the following statements. Make sure to respond to every statement					
		No. Competence	**Little Competence**	**Moderate Competence**	**Much Competence**

1	Install new software on a computer	1	2	3	4
2	Use a printer	1	2	3	4
3	Use a computer keyboard	1	2	3	4
4	Operate a word processing programm (e.g., Word)	1	2	3	4
5	Operate a presentation programme (e.g., PowerPoint)	1	2	3	4
6	Operate a Spreadsheet Program (e.g., Excel)	1	2	3	4
7	Operate a database program (e.g., Access).	1	2	3	4
8	Use the Internal for Communication (e.g., email & Classroom)	1	2	3	4
9	Use the World Wide Web to access different types of information	1	2	3	4
10	Solve simple problems in operating computers	1	2	3	4
11	Operate a Graphics program (e.g., Photoshop)	1	2	3	4
12	Use computers for grade keeping	1	2	3	4
13	Select and evaluate educational software	1	2	3	4
14	Create and organize computer files and folders	1	2	3	4
15	Remove computer viruses	1	2	3	4

Section 5) Instructions: Please identify how often you have computer access in the following contexts

		Daily	**2 or 3 Times a week**	**Once a Week**	**Once a Month**	**Never**
1	In your home	1	2	3	4	5
2	At school (computer lab or library)	1	2	3	4	5

3	Other (Like Internet Cafes, etc.)	1	2	3	4	5