EFFECTS OF ICT-BASED INSTRUCTIONAL APPROACH ON IN-SERVICE TEACHERS' ATTITUDE TOWARD CLASSROOM INTEGRATION AND STUDENTS' LEARNING OUTCOMES IN BASIC TECHNOLOGY

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ABSTRACT

Available studies have substantiated the effectiveness of ICT-based instructional approach on students' learning outcomes in other school subjects but it is rarely used among Junior Secondary School (JSS) students in Ogun State in particular due to teachers' poor attitude to classroom integration. This study, therefore, determined the effects of ICT-based instructional approach on in-service teachers' attitude to classroom integration and students' learning outcomes in basic technology in Junior Secondary Schools in Ogun State.

The study adopted pretest- posttest, control group, quasi- experimental design with 2x2x2 factorial matrix with two phases. Purposive sampling technique was used in the first phase to select 29 teachers from 12 JSS while in the second phase, intact classes of 205 JSS 2 students from six purposively selected secondary schools in Ijebu-East Senatorial District. The experimental and control groups in the first phase were exposed to classroom integration of ICT-based and conventional instructional approaches while those in the second phase were also exposed to ICT-based and conventional instructional resources. Each treatment was for six weeks. Instructional Guides for Teachers and Students were the two stimulus instruments used. In addition, five response instruments used were: In-service Teachers' Attitude to ICT Integration Scale (r = 0.81), In-service Teachers' Computer Attitude Scale (r = 0.80), Students' Academic Achievement Test in Basic Technology (r = 0.76), Students' Attitude towards Basic Technology Scale (r = 0.79) and Students' Computer Attitude Scale (r = 0.87). Seven hypotheses were tested at 0.05 level of significance in each of the two phases, using Analysis of Covariance.

There was significant main effect of ICT-based instructional resources on students' achievement in ($F_{(1,196)}$ =18.27; R^2 = 0.142) and attitude to ($F_{(1,196)}$ = 4.100; R^2 = 0.021) basic technology. There was no significant main effect of students' computer attitude and gender respectively on students' achievement in and attitude to basic technology. There was also no significant interaction effect of students' computer attitude and gender on students' achievement in and attitude to basic technology. There was no significant main effect of ICT-based instructional approach on teachers' attitude to classroom integration. There was also no significant main effect of teachers' computer attitude and gender on their attitude to classroom integration respectively. Further, there was no significant interaction effect of teachers' computer attitude and gender on their attitude to classroom integration.

ICT-based instructional resources enhanced students' achievement in and attitude to basic technology. Sustainable ICT-based resources should be provided and used to promote ICT-based instructional approach in basic technology classrooms to enhance better learning outcomes.

Keywords: ICT-based instructional approach, Basic technology learning outcomes, In-service teachers

Word count: 411

CERTIFICATION

I certify that this work was carried out by Jimoh Olufunbi Akorede, Matric No: 109269 in the Department of Teacher Education, Faculty of Education, University of Ibadan.

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DEDICATION

I wholeheartedly dedicate this work to the Almighty God, the author of this thesis, and the future development that follows.

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J.O. AKOREDE

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LIST OF ABBREVIATIONS

CBE	=	Computer-Based Education
CAI	=	Computer- Assisted Instruction
CAL	=	Computer-Assisted Learning
CBT	=	Computer-Based Training
CD-ROM	=	Compact Disc-Read Only Memory
DOI	=	Diffusion of Innovation
DVD	=	Digital Video Disc
FGN	=	Federal Government of Nigeria
ICT	=	Information and Communication Technology
JSCE	=	Junior School Certificate Examination
JSS	=	Junior Secondary School
TAM	=	Technology Acceptance Model
VTE	=	Vocational and Technical Education

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CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Basic technology otherwise known as introductory technology is an integrated subject and a component of Vocational and Technical Education (VTE) which comprises Woodwork, Metalwork, Building Technology, Auto-Mechanic, Electrical/Electronics and Technical Drawing, taught at the Junior Secondary School (JSS) level as a pre-vocational subject in Nigeria. The objectives of studying basic technology include acquisition of knowledge and basic technical skills to promote technological literacy, career awareness and intelligent understanding of the increasing complexity of technology (FGN, 2004).

Basic technology as a school subject, serves as foundation for technical education, the bedrock of technological advancement of any nation. Basic technology plays crucial roles in the realisation of the need to change from theory-based and white collar job-oriented educational system to practical science and technology-oriented educational system which prepares the individual to be self-reliant and useful to the society. The policy is a deliberate departure from the dogmatic and unimaginative curriculum which has existed in Nigeria since the colonial era (Abimbade, 1998).

It must be noted that, the goals of VTE cannot be realised without developing a well-grounded basic technology, the foundation of technical education through which the economic, social and political status of our nation can be transformed from the third world to be among developed nations (Enemali,2006; European Commission to Lebanon, 2006).The drive towards achievement of basic technology objectives and goals at JSS level can only be measured through students' achievement in and attitude towards the subject. Notably, studies have shown that a number of factors influence students' achievement and if these factors can be controlled, achievement in basic technology can be improved (Bajah,1998;Ayaniyi,2009).

Attitude exhibited by learners determines the importance students will attach to learning process and what they will get out of the learning situation. Observably, the instructional approach employed by the teacher can influence students' disposition towards a subject negatively or positively (Maduabuchi, 2008; Ayaniyi, 2009).Findings have shown that students have poor attitude towards basic technology

(Okorie , 2001;Akorede and Sodunke,2013).The implication is that few or no student will want to offer technical subjects at the Senior Secondary School (SSS) level and in effect there would be dearth of technical education graduates at the tertiary institutions. Hence, the drive towards technological advancement and self-reliance as a nation may not be realized and consequently youth unemployment would be on the increase (Enemali, 2006).

Table 1.2: Statistics of Entries and Results of Students in JSCE Basic Technology in Ogun State (2010 -2012).

YEAR	NO.OF STUDENTS	%GRADE A DISTINCTION	%GRADE C CREDIT	% GRADE A & C DISTINCTION & CREDIT	%GRADE P PASS	%GRADE F FAIL	% GRADP & F BELOW CREDIT
2010	68073	7.7	63.9	71.6	28.0	0.43	28.4
2011	69214	3.0	54.1	57.1	37.6	5.3	42.9
2012	76169	3.8	52.9	56.7	38.2	5.4	43.6

Source: Ogun State Ministry of Education, Abeokuta

The status of students' achievement in basic technology is a pointer to the level of effects of instructional approaches used in teaching the subject. Available data on statistics of entries and results of students in Junior School Certificate Examination (JSCE) in basic technology between 2010 and 2012 in Ogun state shows that the trend of better achievement is going down while the trend of poor achievement is rising. In 2010, 71.6% of students who sat for the JSCE had distinction and credit grades while it was 57.1 and 56.7 % respectively in 2011 and 2012. In addition, the percentage of students who failed in 2010 was 0.43 while it was 5.3 and 5.4% respectively in 2011 and 2012 (Table 1.2). Further, students who passed through Junior Secondary School is expected to be technological literate, technologically inclined, answer practical-related questions correctly and be able to use simple hand tools to effect some repairs on common domestic appliances but unfortunately this is not so. This shows that there is urgent need for intervention to arrest the unpleasant trend in teaching and learning of the subject.

Notably, achievement in basic technology would have been better if there is good attitude towards the subject and this can be achieved through adequate instructional approaches which would promote good attitude and lead to improved achievement. This unpleasant situation might be traced to lack of materials, tools and equipment to facilitate practical demonstration in basic technology workshop which accounted for poor teaching methods and inappropriate instructional approaches (Okebukola and Jegede, 1997). In addition, lots of disadvantages have been ascribed to conventional instructional approaches (Baron ,2000 and Aremu,2010). Different conventional instructional approaches include lectures, discussions, hands-on, team teaching, and project method although a combination of approaches may be necessary. Lecture entails communicating theories, ideas and facts to students, discussion entails encouraging practice and application of course materials, team teaching involves two or more teachers teaching different aspects of a subject while hands-on and project method require practical demonstrations. These two approaches clarify vague or confusing concepts. Each of these approaches are supplemented with the use of conventional instructional resources such as wall charts, real objects and models. Notably, these conventional instructional resources become inadequate in teaching and learning that rely extensively on practical demonstration. Further, where they are available, they are not effective in showing manipulation of learning materials in order to equip learners with prerequisite skills in basic technology classrooms.

The need to improve students' achievement in and attitude towards the subject through innovative approaches calls for attention. This has led to different efforts geared towards finding appropriate instructional approaches more appealing to the average learners on one hand and improved achievement in and attitude towards the subject on the other. Ajaja (2005) recommends, among others, the need to improve on the quality of instructional approaches used in curriculum delivery in basic technology through appreciable rise in the level of funding by the different tiers of governments but the poor funding syndrome still persists. For knowledge and basic skills in basic technology to be acquired there is need to employ appropriate instructional approaches that can present practical-related learning experiences through virtual learning environment in basic technology classrooms. The tool that can be used to enhance such instructional approaches is Information and Communication Technology (ICT).

Information comprises knowledge, ideas, facts and skills that when given out or received makes sense to the receiver and it can be written, gestured, stored, interpreted and retrieved. It is a powerful instrument in all spheres of life including education. Communication is the process of expressing ideas and feelings, passing information from one person to another. It can be transmitted using computer, radio, television monitor, video recorder, mobile phone, DVD player and compact discs among others. Technology can be defined as how to use human knowledge, skills, scientific theories and the material resources to meet human needs (Izuagba, 2010). ICT as combined terms can be defined as acquisition, processing, storage, and dissemination of information by combination of computers and telecommunication accessories.

Literature revealed that integration of ICT-based instructional approach can improve students' learning outcomes in teaching and learning of different subjects (Aiyelaagbe, 1998; Bandele, 2006; Jenkin, Purushotma, Clinton, Weiged and Robinson, 2006; Babalola and Omodara, 2007; Alonge and Akinyede, 2007; Ogunleye, 2009; Ituen, 2009; Tella, 2011; Adedoja and Kosoko-Oyedeko, 2012. The various kinds of ICT tools available and having relevance to education, such as mobile phones, laptop, CDs, television monitor, DVD player, teleconferencing, e-mail, audio conferencing, radio broadcast, interactive radio counselling, interactive voice response system, audiocassettes and CD ROMs among others have been used in education for different purposes (Bhattacharya and Sharma, 2007).

Instructional approaches are methods used in the lesson to ensure that the sequence or delivery of instruction helps students to learn. This means that students' learning outcomes will improve when effective instructional approaches are used. Once the learning objectives and evaluation tools are identified, the next thing is to consider instructional approaches that will arrest students' interest and help them meet lesson objectives.

The method of facilitating instructional process with the use of ICT-tools is referred to as ICT-based instructional approach. It can be used to present instructional content, instructional resources or both. In this study, it is used to present instructional resources in basic technology classrooms. According to Olorundare (2006), ICT-based instructional approach has the following potentials in the implementation of the school curriculum; It accelerates and deepens students' basic skills in any school subject; challenges students to learn independently and hence, be responsible; help to

upgrade students' academic knowledge and instructional practices. Further, it prepares the individual learners for economic survival and to become productive in future world of work that is ICT-driven and teachers with efficient and effective tools to take care of students' individual differences.

Three objectives are distinguished for use of ICT in education, it is used as object of study, as an aspect of a discipline or profession and as a medium for teaching and learning. The use of ICT in education as object of study refers to learning about ICT which enables the students use ICT in their daily life. The use of ICT as an aspect of a discipline refers to the development of ICT skills for professional or vocational purposes while as a medium for learning, it focuses on the enhancement of the teaching and learning process (Drent and Meelissen, 2008).In addition, Hawkridge (1990) reports three different reasons or rationales that drive policies related to the classroom integration of ICT in education. These are economic rationale, the development of ICT skills is necessary to meet future needs for a skilled workforce, as learning is related to jobs and careers; social rationale, all pupils should be familiar with computers to become responsible and well-informed citizens; and educational rationale, a supportive tool to improve teaching and learning. These rationales illustrate the range of functions ICT could have in the educational process. To realise these potential benefits, many governments and organisations have supported ICT integration in education.

One of the aspects of education where ICT is very useful and applicable is in its use to improve instructional approaches in the classroom. This can be described as use of ICT- tools for acquiring and disseminating information to achieve instructional objectives during teaching and learning process. ICT-based instructional approaches have been adopted in classrooms in most places around the world. It has been recognised as a strategy to boost the teaching-learning process (Moses, Khambari and Luan, 2008; Yee, Luan, Ayub and Afshari, 2009; Bakar, Luan, Samah and Fooi, 2008; Mahmud and Ismail, 2010; Luan, Atan and Sabudin, 2010).The adoption of ICT-based instructional approach at the classroom level justifies the fact that this approach is not only veritable and versatile as well as central to teaching and learning, yet, it is rarely used in basic technology classrooms.

In spite of its usefulness and effectiveness in teaching and learning of school subjects, Jegede (2006) observes that teaching and learning with ICT-based instructional approaches in primary and secondary schools in Nigeria remain

marginally adopted especially in basic technology classrooms. Adeyemi (2007) notes that basic technology teachers are aware of the use of ICT-based instructional approach in teaching and learning but in spite of this classroom integration is marked with difficulty. Teachers still pay less attention to its classroom integration; there are no effective ways to implement its daily classroom integration and teachers are still resistant to its adoption. Perhaps, this may be due to their attitude, lack of ICT knowledge and skills in classroom use of ICT-tools.

During the early attempts of integrating computers into education systems the technology itself was over emphasised at the cost of the human side. These attempts were based on the assumption that technology can revolutionise education and therefore, resources and efforts were diverted to providing schools with computers and other technologies. During that stage, technology was conceived as an end in itself, which resulted in computers being distributed to schools with little thought given to their best use (Richardson, 2005). However, the early attempts were doomed to failure as it became clear that technology could not improve educational practices and outcomes by itself. Therefore, emphasis was shifted from the technology itself towards other supporting factors that can facilitate successful integration of ICT across education systems. The failure of the early attempts to facilitate classroom integration shifted the attention considerably to other factors.

Among other factors, teacher-related variables are the most powerful predictors of classroom integration of ICT (Deniz, 2007; Drent and Meelissen,2008).In the same vein, the level of success in classroom integration of ICT in schools is not only dependent on quality or sophistication of the technology, but on teachers' readiness and positive disposition towards classroom use of ICT (Deniz,2007). Egunjobi and Akorede (2008) in addition, indicate that teachers' perception is another variable that can influence classroom use of ICT. The United States Department of Education (2010) reports that despite favourable conditions for classroom integration of ICT, the percentage of teachers who use it in the classroom is limited. Notably, there is need to focus more on teacher-related factors that can enhance classroom integration of ICT. Some of the teacher-related factors such as age, gender, religion and marital status cannot be influenced while others such as ICT-related knowledge and skills, teachers' attitude to classroom integration of ICT and motivation can be influenced (Tondeur, Hermans,VanBraak and Valcke, 2009; Afshari, Bakar, SuLuan,Samah, and Fool,2009). Tsai and Tsai (2003) acknowledge

that not much can be done to influence teacher-related factors such as beliefs, age and gender in order to enhance classroom integration of ICT.

Teachers' attitude to classroom integration of ICT can be influenced through teachers' training in ICT. Teacher's training in ICT is an approach through which teachers are trained to acquire basic ICT skills that can facilitate successful ways of integrating ICT for classroom instructional purposes as suggested by Collis and Jungs (2003). Notably, research indicates that classroom integration of ICT can improve instructional approaches that will facilitate student-centered learning and in developing the higher order skills and promoting collaborative activities (Hadad ,2003).Majority of the countries of the world that have recognised the importance of ICT in teaching and learning have provided ICT teacher training in variety of forms and degrees. Teachers can be trained to learn how to integrate ICT in the classroom, can be trained via ICT or ICT can be used as a core or complementary means to the teacher training process (Collis and Jung, 2003).However, successful classroom integration of ICT depends partly on forms and quality of ICT teacher training. Collis and Jungs (2003) classify ICT teacher training approaches thus:

- ICT as main content focus. It provides basic ICT skill and it is used in Singapore.
- ICT as part of content or methods. It uses videotape and CD-ROM to help US teachers view how technology can be integrated into their work.
- ICT as core delivery technology. It provides different ICT applications and it is internet- based.
- ICT as facilitating or networking technology. It is used to train teachers on-line to become on-line course instructors and course developers. It is used in Uganda.

The evidence that is presented in the reviewed literature does not dispute the value of these approaches. Notably, the only approach that has been extensively used in Nigeria is acquisition of basic ICT skill which has not been effective to facilitate classroom integration of ICT (Jegede, 2009).The use of other three approaches is rare especially among basic technology teachers. In this study, basic technology teachers were trained using ICT as part of content or methods approach which entails video presentation to facilitate classroom integration of ICT. This ICT teacher training approach is selected for training teachers on ICT-based instructional approach because it focuses on practical ways of classroom integration unlike basic ICT skills

which only exposes teachers to uses of ICT tools and other approaches which either require long period of training or rely extensively on internet facilities which make its application costly and unreliable in a situation where electricity is not stable.

Video presentation entails using videos to expose teachers to successful ways of identifying, capturing and presenting instructional resources relevant in teaching and learning of selected topics in basic technology using relevant ICT tools such as mobile phones, laptops, DVD player, television monitor, CDs and card reader. This approach was used in United States of America in 2002, to facilitate ICT integration among teachers but its use in Nigeria especially among basic technology teachers is very rare, hence the need to use this approach

Alinson (2010) reports that majority of teachers believe that classroom teaching and learning can be improved through integration of ICT but many have not been exposed to specific or practical ways of using it in the classroom. Informal observation by the researcher shows basic technology teachers are still inclined to the use of conventional instructional approaches and seemingly resistant to use of ICT-based instructional approaches. So far, it has been observed that less attention has been paid to use of ICT-based instructional approach in state public schools in terms of developing capacities of basic technology teachers to facilitate classroom integration of ICT and in few cases where they were exposed to ICT-based training programmes, it was not sufficiently effective to influence their attitude towards its classroom integration. Takang (2008) reports that classroom integration has been tested in some secondary schools in Abuja with the aim of working with Federal Ministry of Education to replicate this in all schools in the Local Government Areas (LGAS) in the federation but the study was abandoned.

In addition, it has been reported that Multichoice (an International Multimedia Company), with some multinational companies collaborated to take technology into classrooms in Lagos State schools. The innovative project involves eight schools with each provided with television monitors, DVD players and culturally relevant DVDs that will assist the learners to better understand a broad range of subject matter (Lawal, 2008).Notably, in primary schools chosen in Lagos SState, no specific subject was emphasised and teachers were not exposed to how the DVDs were produced. Teachers were just trained to use DVDs in selected schools and this may not be as effective as if they were involved in its production.

In spite of research efforts, a contradiction exists between classroom integration of ICT and widespread use of ICT in human endeavour. In addition, its classroom use to improve teaching and learning and to make learning meaningful is rare especially in basic technology classrooms (Ministry of Education of People's Republic of China, 2006; Wanzah wan Ali,2008).

This study entails exposing in-service basic technology teachers in JSS to video presentation of ICT-based instructional approach to determine its effect on their attitude to classroom integration of ICT in basic technology classrooms. Teachers with positive computer attitude were further guided on how they can produce ICT-based instructional resources to teach selected practical- related topics in basic technology among JS II students in public schools while the researcher provided necessary ICT tools and printed training manual guide. Three teachers among those that participated fully and effectively in the training were randomly selected to teach in the classroom.

This study is designed to make use of DVD player and television monitor for exposing basic technology teachers to ICT-based instructional approach. The decision to use this type of instructional tool is because it is relevant and compatible with the conceived study, readily available, affordable, durable and portable. The researcher provided flat screen television, DVD player and other necessary tools required for classroom presentations in an attempt to train the participants on how these ICT tools can be used in the classroom.

There are some variables that can influence ICT-based teaching and learning by the teachers and students. Such variables include teachers' computer attitude, teachers' gender, students' computer attitude, and students' gender. Computer attitude is defined as disposition to use of computer in learning environment. Computer attitude is classified into positive and negative. Teachers and students are said to have positive computer attitude when they have favourable disposition to the use of computer in the learning environment while they have negative attitude when they have unfavourable disposition to use of computer in the learning environment. The strong relationship between computer-related attitudes and ICT integration in teaching and learning has been emphasised in past studies. Positive computer attitudes are expected to foster ICT integration in the classroom (Van Braak, Tondeur and Valcke, 2004). A major reason for studying teachers' computer attitude is that it is a major predictor for future computer use in the classroom (Myers and Halpin, 2002).

Among few studies on relationship between students' computer attitude and achievement in school subjects, Tsai and Tsai (2009) observe that students who were diligent, with self-discipline and willing to work hard tend to possess positive computer attitude. They further indicate that students' who have good learning strategies especially the strategies of information processing, selecting main ideas and test strategies are inclined to have positive computer attitude . This implies that students with good achievement in school subjects are likely to have positive computer attitudes. Selwyn (1997) classifies Computer attitude into four components which reflects positive or negative disposition which are affective, perceived usefulness, perceived control and behavioural intention. Notably, these studies were not conducted in Nigeria and where they were, basic technology teachers and students were not the focus, hence the need to replicate this study among basic technology teachers and students in Nigeria.

Gender is one of the variables that will influence ICT-based teaching and learning. Rosnaini and Mohd (2010) and Mudasiru and Balogun (2011) observed that ICT integration is still dominated by men while women have limited access to ICT-tools whereas, Birisci and Karakas (2009) observe that there was no significant difference in attitude of male and female teachers towards computer technologies. The expected findings of this study would hopefully shed more light on these conflicting standpoints.

Onasanya,Daramola and Asuquo (2006) contend that there is no significant difference between the performance of male and female students in introductory technology when exposed to different modes of CAI. In this study, gender influence on students' achievement in basic technology was examined. Arguably, attitude towards basic technology is defined as disposition of students to teaching and learning of the subject. Oriahi, Uhumugvbi and Aguele (2010) observe that male have more positive attitude to science education than female students. Ozioma (2011) indicates that gender is one of the variables that influence students' attitude and its influence on students' achievement in and attitude towards basic technology will be investigated in this study. It is against this background that this study investigated the effect of ICT-based instructional approach on teachers' attitude to classroom integration of ICT and students' achievement in and attitude towards basic technology.

1.2 Statement of the Problem

In spite of efforts in finding appropriate and effective ways of teaching and learning basic technology at the JSS level, students' attitude towards the subject is still poor while achievement in the subject in the past few years is going down. Hence, there is need for improvement in students' learning outcomes in the subject. One of the attempts to improve this situation is a shift from the conventional way the subject is taught to ICT-based instructional approaches. Notably, the implementation is still marked with apathy on the part of the teachers, possibly due to their poor attitude, lack of necessary ICT knowledge and skills in effective classroom integration of ICT.

The study therefore determined the effects of exposing teachers to ICT-based instructional approach on their attitude to its classroom integration on one hand, and students' achievement in and attitude towards the subject on the other. The moderating effects of teachers' and students' computer attitude and gender were also investigated.

1.3 Hypotheses for first study phase

In the first phase of this study, seven null hypotheses were tested at .05 level of significance:

Ho_1: There is no significant main effect of treatment on teachers' attitude to ICT integration.

Ho_2: There is no significant main effect of teachers' computer attitude on their classroom integration of ICT.

Ho_3: There is no significant main effect of teachers' gender on their attitude to classroom integration of ICT.

Ho_4: There is no significant interaction effect of treatment and teachers' computer attitude on their attitude to classroom integration of ICT.

Ho_5: There is no significant interaction effect of treatment and teachers' gender on their attitude to classroom integration of ICT.

Ho_6: There is no significant interaction effect of teachers' computer attitude to and gender on their classroom integration of ICT.

Ho_7: There is no significant interaction effect of treatment, teachers' computer attitude and gender on their classroom integration of ICT.

1.4 Hypotheses for second study phase

The following seven null hypotheses were tested at .05.level of significance in the second phase of the study:

HO_1: There is no significant main effect of treatment on students':

(a) Achievement in basic technology

(b) Attitude towards basic technology

HO_2: There is no significant main effect of students' computer attitude on their:

(a) Achievement in basic technology

(b) Attitude towards basic technology

HO_3: There is no significant main effect of students' gender on their:

(a) Achievement in basic technology

(b) Attitude towards basic technology

HO_4: There is no significant interaction effect of treatment and students' computer attitude on their:

(a) Achievement in basic technology

(b) Attitude towards basic technology.

HO_5: There is no significant interaction effect of treatment and students' gender on their:

(a) Achievement in basic technology

(b) Attitude towards basic technology.

HO_6: There is no significant interaction effect of students' computer attitude and gender on their:

(a) Achievement in basic technology

(b) Attitude towards basic technology.

HO_7: There is no significant interaction effect of treatment, students' computer attitude and gender on their:

(a) Achievement in basic technology

(b) Attitude towards basic technology

1.5 Scope of the Study

The study covered basic technology teachers as well as students in public JSS in Ogun State, Nigeria. It focused on the effects of ICT-based instructional approach on teachers' attitude towards ICT-integration and students' achievement in and attitude towards the subject. The moderating effects of computer attitude and gender of the basic technology teachers and students were also investigated.

Six sub- topics under Maintenance of domestic appliance were selected as the content to be taught in this study. The rationale for selecting this topic is based on informal assessment of basic technology students' achievement in practical- related topics in JSCE in the past few years by the researcher which indicated the need for improvement due to lack of materials, equipment and adequate instructional materials. The topic involves learning experiences that cannot be provided within the four corners of the classroom.

1.6 Significance of the Study

The findings of this study would provide some guides or insights on issues associated with integration of ICT in basic technology classroom.

In addition, understanding how ICT-based instructional approach influences basic technology teachers' attitude to ICT integration would serve as a means of developing teacher education curriculum relevant to the contemporary knowledge age. The findings of this study would also help schools and colleges intending to integrate ICT in curriculum delivery make a wise decision on best approaches to adopt in preparing teachers to integrate ICT in the classroom.

Finally, the findings of this study would provide other researchers with additional empirical support on the effectiveness of ICT-based instructional approach on teachers' attitude towards ICT integration and students' learning outcomes in basic technology.

1.7 Operational Definition of Terms

The following terms were operationally defined:

ICT-based Instructional Approach for Teachers: This is the video presentation of classroom integration of ICT-based instructional approach which the teachers were exposed to in this study.

ICT-based Instructional Approach for Students: This is the video presentation of instructional resources (practical demonstrations of maintenance and different maintenance methods in basic technology) which the students were exposed to in this study.

ICT-based Training: This can be described as exposing teachers to successful ways of identifying, capturing and presenting instructional resources relevant in teaching and learning of selected topics in basic technology using relevant ICT tools such as mobile phones, laptops, DVD player, television monitor, CDs and card reader.

In-service Teachers: Practicing teachers in the state public JSS who hold at least NCE as minimum teaching qualification in Ogun State

In-service Teachers' Attitude to classroom Integration of ICT: This refers to in-service teachers' disposition towards the use of ICT tools for instructional delivery in basic technology classroom as measured by in-service teachers' attitude towards ICT inventory.

Instructional Resources: These are broad range of practical-related learning experiences in basic technology captured on video CD for instructional purposes.

Students' Achievement: This is the extent to which students have benefitted from teaching of basic technology in the study as measured by scores in achievement test

Students' Attitude to Basic Technology: This refers to students' disposition, likeness and flair for learning basic technology as a school subject as measured by attitude scale.

Students' Computer Attitude: Computer attitude is defined as students' disposition to general use of computer as measured by computer attitude scale. Computer attitude is classified into positive and negative

Students' Learning Outcomes: Learning outcomes in this study are Achievement in Basic Technology and Attitude towards Basic Technology.

Teachers' Computer Attitude: Computer attitude is defined as basic technology teachers' disposition to general use of computer as measured by computer attitude scale. Computer attitude is classified into positive and negative.

CHAPTER TWO

REVIEW OF LITERATURE

2.0 Introduction

Related literature for this study were reviewed under the following subheadings:

2.1 Theoretical Framework

2.1.1 Diffusion of Innovation Theory (DOI)

2.1.2 Technology Acceptance Model

2.1.3 Conceptual Framework

2.1.4 Historical Perspective of ICT Integration

2.1.5 Review of past studies on Technology Integration

2.1.6 Developmental Stages of ICT Integration

2.2 Empirical Literature

2.2.1 The Concept of I.C.T

2.2.2 ICT in Education

2.2.3 ICT in Classroom Setting

2.2.4 ICT in Secondary Education

2.2.5 ICT and Students' learning

2.2.6 ICT Tools in Teaching and Learning

2.2.7 Uses of Mobile Phone as ICT Tool

2.2.8 Uses of Computer in Teaching and Learning

2.2.9 ICT and Teacher preparation

2.2.10 Integration of ICT and Teacher Capacity Building

2.2.11 ICT-based instructional Resources

2.2.12 International Initiative to support classroom Integration of ICT (NEPAD and OLPC)

2.2.13 The 5J Approach to help Teachers integrate ICT in the classroom.

2.2.14 Developing ICT Curriculum Model for Secondary School Education

2.2.15 Constraints affecting Teacher use of ICT in the classroom

2.2.16 Problem of Utilisation of ICTs in Schools

2.2.17 ICT-based Instruction and Teachers' Attitude to Integration of ICT

2.2.18 Influence of Computer Teachers' Attitude on their Attitude to Integration of ICT

2.2.19 Teachers' Gender and their Attitude to Integration of ICT

2.1 Theoretical Framework

This study is based on Diffusion of innovation theory.

2.1.1 Diffusion of Innovation Theory (DOI)

Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 1995). Diffusion of innovation is a theory of how, why and at what rate new ideas and technology spread through cultures. Diffusion of innovations theory seeks to explain adoption and spread of new ideas. Rogers proposed four main elements that influence communication; channels, time, rate of adoption and a social system. He defines innovation as an idea, practice or object that is perceived as new by an individual. Time is defined as the innovation decision period required to pass through the innovation decision process, rate of adoption is the relative speed with which an innovation is adopted by members of a social system while social system is defined as a set of interrelated units that are in joint problem solving to accomplish a common goal. Three types of innovation decisions within diffusion of innovations have been identified:

- optional innovation – decision – This decision is made by an individual who is in some way distinguished from others in a social system.
- collection innovation – decision – This is a collective decision made by all individuals of a social system .
- authority innovation – decision – This decision is made for the entire social system by few individuals in position of influence

Diffusion of innovation theory explain that disciplines such as agriculture and marketing have used diffusion theory to increase the adoption of innovative products and ideas, the application of diffusion theory will be useful for examining and

explaining how classroom adoption of ICT-based instructional strategies by teachers can be explained. Diffusion of innovation theory is therefore relevant to this study as it helps to explain, predict and account for factors that increase or impede classroom integration of ICT-based instructional approaches.

2.1.2 Technology Acceptance Model

The model that explains this theory is Technology Acceptance Model (TAM) developed by Davis,Bagozzi and Warshaw (1989) and it was based on the work of Fishbein and Ajzen (1980) designed to investigate the reasons why some people use computer and their attitudes towards it. The TAM was specifically developed with the primary aim of identifying the determinants of computer acceptance in general; second; to examine a various information technology usage behaviours and third; to provide a parsimonious theoretical explanatory model. This model links the perceived usefulness and ease of use with attitude towards using ICT.

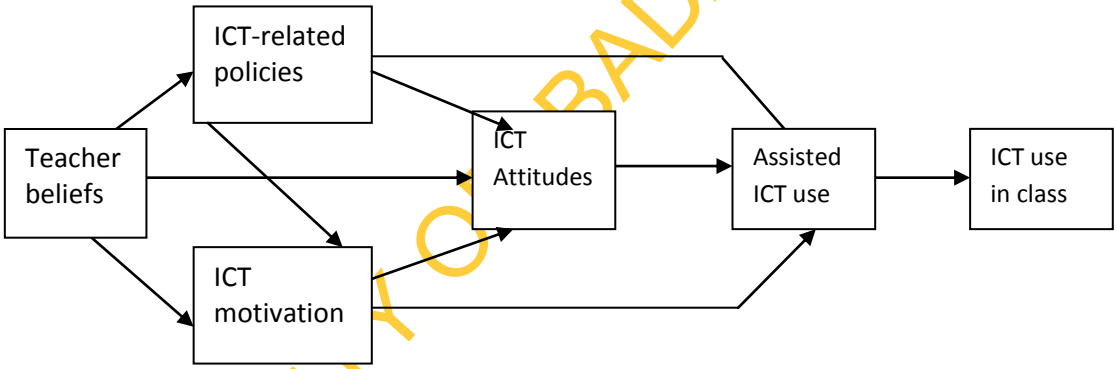


Figure 2.1: Integrated model of the impact of teacher beliefs, ICT-related variables, assisted ICT use on ICT use in the classroom. Davis, Bagozzi and Warshaw, (1989).

The TAM states that attitude would be a direct predictor of intention to use technology which in turn would predict the actual usage of the technology. This model is relevant to the study in the sense that it provides basis for identifying and understanding factors that will influence teachers' intentions to integrate ICT which depend on attitude towards classroom integration of ICT, perceived usefulness and ease of use of ICT in the classroom. Technology acceptance model links the perceived usefulness and ease of use with attitudes toward using ICT and actual use. It has explicitly been developed in view of describing and explaining technology adoption and use. Consequently the effects of such integration helps to determine the

effectiveness of ICT-based instructional approach and conventional instructional approach on students' achievement in and attitude to basic technology Further, it provides understanding of relationships between attitude and intention to use ICT which in turn can predict the actual usage of ICT in basic technology classroom. Attitude towards technology use is jointly determined by perceived usefulness and perceived ease of use. Teachers' decisions to use ICT in their classroom teaching may be related to teachers' attitude among other variables

According to Fishbein and Ajzen (1975), attitudes refer to the ability to predict a person's behavior toward certain targets. Ajzen (1991) described an attitude as a predisposition to respond favorably or unfavorably to an object, person, or event. The strong relationship of computer related attitudes and integration has been documented in many studies (e.g., Myers and Halpin, 2002; van Braak, 2001). For instance, Myers and Halpin (2002) argued that a major reason for studying teachers' attitudes is that it is a major predictor of classroom ICT use. Attitudes towards computers influence teachers' acceptance of the usefulness of technology, and also influence whether teachers integrate ICT into their classroom (Clark, 2001).

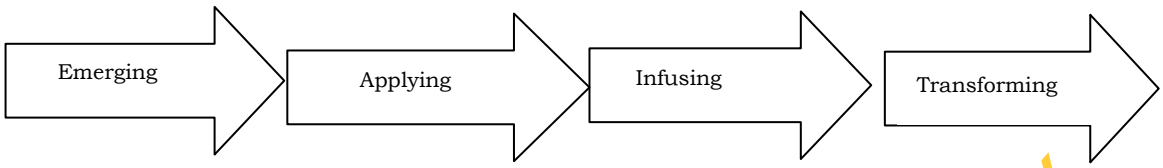
Van Braak et al. (2004) also supported that class use of computers was strongly affected by attitudes toward computers in education.

2.1.3 Conceptual Framework

Multitude of variables and processes; e.g., educational beliefs, self-efficacy beliefs, attitudes, motivation, perceptions have been referred to by many authors .From a theoretical point of view, it is hardly possible to integrate this existing variety of conceptual orientations, choices, and boundaries into a single conceptual framework. Therefore, it is preferable to reposition a number of these variables and processes into a new conceptual framework that serves as a guide to integrate theoretical perspectives that interlink these variables and process and help to explain the actual adoption of ICT in education by teachers.

The conceptual framework adopted for this study is a Continuum of ICT Integration Approaches in Teacher Development by Ng, Miao & Lee (2008). It identified four broad approaches from the research literature for developing a model for ICT integration in Teacher Development. The adopted framework depicts an approach continuum whereby the skills of teachers flow from emerging to applying to

infusing and transforming stages of ICT integration. As teachers move through each stage, they develop increasing capability to integrate ICT in their day-to-day activities and master the use of ICT as an effective tool for teaching and learning.



Ability to use ICT at a basic level	Ability to make general and specific uses of ICT	Ability to make dynamic and complex use of ICT	Ability to experiment and innovate with ICT

Source: Ng, Miao and Lee (2008)

Figure 2.2: A Continuum of ICT Integration Approaches in Teacher Development

In the emerging stage, the teacher development focus is on the use of ICT as an add-on to the conventional approach. Teachers and learners are discovering ICT tools and their general functions and uses, emphasis is usually on basic ICT literacy and skills. In the applying stage, focus is on the development of digital literacy and how to use ICT for professional improvement in different disciplines. This involves the use of general as well as particular applications of ICT. In the infusing stage, the teacher development focus is on the use of ICT to guide students through complex problems and manage dynamic learning environments. Teachers are developing the ability to recognise situations where ICT will be helpful, and choosing the most appropriate tools for a particular task and using these tools to solve real problems. In the transforming stage, the learning situation is transformed through the use of ICT. This is a new way of approaching teaching and learning situations with specialised ICT tools. Teachers are master learners and knowledge producers who are constantly engaged in educational practice and innovation to produce new knowledge about learning and teaching practice.

2.1.4. Historical Perspective of ICT Integration

The historical overview of integration of ICT into teaching and learning at all levels of education is considered essential in this study. Liu (1997, 2004) analysed the development of the relationship between ICT and education, and divided the whole

process into four stages: coexistence of computer literacy and CAI, integration of ICT and curriculum, ICT-based curriculum transformation and ICT-based education reform. Currently, Chinese governmental and educational organizations are paying more and more attention to "informationisation" of education (MOE, 2008). The government has paid additionally attention to prepare pre-service teachers and to educate in-service teachers to integrate ICT into their classroom teaching, by offering ICT literacy training programmes at the teacher education institutes (Yuan, 2006). Nowadays, more and more teachers are having possibilities to use ICT in their teaching. It is not exaggerated to state that accesses to ICT are no longer obstacles for teachers (MOE, 2008). As a result, ICT in education has made significant progress and achievements both in the developed areas and in Western rural areas (Zhao and Xu, 2010). The effectiveness of ICT in education has considerably improved, teachers' competence of ICT has been strengthened, and the traditional teaching and learning approach has been significantly refined (Zhang, 2007; Zhao, 2009). Both teachers and students are familiar with ICT and would like to use it to support their teaching and learning (Zhao and Xu, 2010).

Notably, despite the positive picture that is reflected in many reports, relatively few teachers use ICT regularly in their teaching activities and the impact of ICT on existing curriculum is rather limited. Yuan (2006) reports, that teachers are failing to use materials from the Internet and they mainly "use computers as Television sets". There is a serious contradiction in the attempt to integrate ICT into education (Li, 2003). Xie (2006) argues that researchers should help teachers develop their beliefs about ICT in primary and secondary schools. A better understanding and developing of teachers' beliefs and attitude should be an important step in modern educational reform (Xie, 2006; Zhao and Xu, 2010). As mentioned above, researchers in Western settings state that internal factors of teachers may play important roles in ICT integration. This understanding is a rationale for the present research which considered teachers' attitude to classroom integration as an important factor in ICT-based instructional approach in basic technology classroom.

2.1.5 Review of past studies on Technology Integration

Roblyer and Edwards (2000) made comparison studies before and after 1980 and presented their report that nearly all the estimated 200 studies conducted indicated

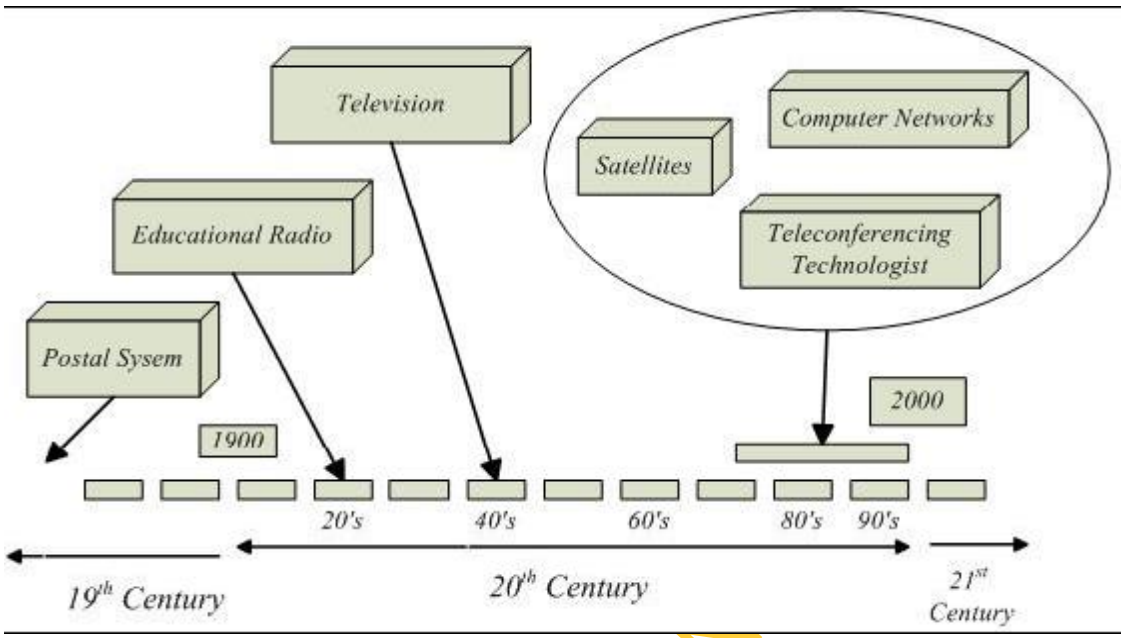
positive evidence that computer-based treatments offered some benefits over other methods, while summary of limitations observed include; reduction in learning time; limited improvement in motivation toward learning; computer-based treatments were generally effective in mathematics and reading/language; computer-aided learning (CAI) was more effective as a supplement at lower grade level; slow learners and under-achievers seemed to gain from computer-based methods than more able students; computer-based methods are generally more effective at lower grade levels. Effectiveness of computer-managed instruction (CMI) seems to increase at higher grade levels while CAI effects seem to decrease at higher levels.

For the post-1980 review (Roblyer and Edwards, 2000), observed positive effects of CAI on achievements, attitudes, content area, application type and college students. Much educational research on ICT has been conducted over the past ten years, with more large scale studies evidently from the United States and the United Kingdom though there are reports of research in different parts of Europe. Literature reviews in this field are important not only to educators but to policy makers who are usually reluctant to fund large-scale longitudinal studies.

Yelland (2001) reports the need for such funding in Australia to support a variety of research studies which should include a mixed-method research design (Yelland, 2001). Such research would recognise positive effects and identify any negative influences. In this way we could determine how best to promote effective learning so that outcomes are improved.

2.1.6 Developmental Stages of ICT Integration

Researchers record the evolution of ICT from its introduction in the classrooms of technologically advanced countries. Taylor (1999) and Shelly, Cashman, Gunter and Gunter (2006) state that the first use of ICT in schools was in the form of print technology, duplicating textbooks; second, technology became a multimedia model based on print, also using audio and video technologies; the third model was based on opportunities ITC provides for synchronized communication; and fourth, the flexible learning model is based on online delivery of instruction through the internet. The evolution of information and communication based technologies is described by the Ministry of Education in the figure 2.4 below:



Source: Ministry of Education, 2003c

Figure 2.3 *Stages of ICT Development*

Technological development in electronics contributed to the development of computers, enabling the production of quality machines at low cost and in compact sizes suitable for home use by individuals. The use of microcomputers in education started in 1976 with the first-generation Apple computer, replaced soon after by the Apple II computer. In the following decade, it became the most widely-used computer in American public schools because it was considered the first user-friendly computer (Roblyer, 2006) .The advent of the world wide web (www) in the mid 1990s resulted in a proliferation of systems and applications, particularly in education (Roblyer, 2006).Internet users at the time, according to Elston (2007), are "about 30 million people in the UK and about 600 million worldwide (who) now use the internet to search for information and send e-mails". The Australian Bureau of Statistics (2002) reports that internet users in Australia increased from 260,000 in 1996 (when data was first collected) to 2.7 million in 2000, and at the time, almost half of children aged five to fourteen years had accessed the internet, with just over a quarter of all children accessing it from home and almost a third using the internet at school. In Australia, the majority of schools give a high budget priority to the provision of ICT for students and for teachers (Australian Bureau of Statistics, 2000). In 2004, there were more than

16.4 million internet users in eighteen Arab countries; by 2005 this rose to 26.3 million (Mader Research Group). In Saudi Arabia, the internet was used by government agencies from the inception of the World Wide Web about 1994; however, it was not made available to the general public until 1999. By 2005, there were 2.54 million users in the Kingdom, which was then one of the fastest-growing internet markets (Government of Saudi Arabia, 2007).

The development of computer technology and the internet in the educational field may be divided into three periods: the pre-microcomputer era, microcomputer era, and as applications and usage evolved, ICT became integrated with education as authorities pursued more intensive programmes and projects to bring ICT technologies into the reach of every student (Harrison, Comber, Fisher,Haw, Lewin, Lunzer, Mcfarlane, Marvers, Scrimshaw, Somekh and Watling, 2002). Thus, ICT has penetrated educational systems, forming new databases and linkages to allow students access to knowledge repositories across the world (Semenov, 2005; UNESCO, 2009).

The successful integration of ICT is a complex development, as it depends on interlinking variables, such as overcoming issues concerning teachers' professional development, financial and technical resources, curriculum, teachers' and principals' attitudes (Akbaba-Altun, 2006).

2.2 Empirical Literature

2.2.1 The Concept ICT

ICT is the acronym for information and communication technology. The word "information" according to World Health Organization (WHO) in Nwachukwu (2008) is message intended for communication, it refers to knowledge and ideas which are provided in order to increase awareness in people, information has to do with the sum of knowledge to be transmitted from agents of change to the target groups.

Communication is one of the processes of transferring information from one person to another. Onyeonia and Obiekezie (2000), defines communication as the process of transferring ideas, skills or attitudes from one person to another accurately and satisfactorily. As a science, it tends to explore all dimensions of information or message transmission including the emission, source, the nature of the message, the reception, the circumstance and the effects of the transmission. Onyeoma and Obiekezie further posited that for communication to take place there must be a sender,

a message, a transmission channel, a receiver who decodes and understands the message, a common language, time for the process to take place and one or more purposes to be served. Onyejemezi (1992) opined that communication is the process of sending and receiving information (message) which includes all the ways and manner through which we can let other people know and share our thoughts, feelings, experiences and knowledge. It can also be defined as the process of interaction which involves the sharing of knowledge and experience between two parties — the sender and the receiver respectively.

Technology is a way of thinking about problems and the feasibility of the proposed solution. As a word, it is usually misunderstood. Nwachukwu (2008) explained that technology is not a machine, but a planned systematic method of working to achieve outcomes. He further explained that technology involves systems, organizational patterns, and procedures, various forms of analysis, research and development.

In summary, therefore, ICT is a combination of micro electronics, computer hardwares and soflwares, telecommunications that enable the processing and storage of huge amounts of information and its rapid dissemination through computer networks.

2.2.2 ICT in Education

Computers have been found to facilitate to a great extent progress in the field of education. Abdulsalam (1997) opines that the field of educational technology as one that identifies and incorporates all technological devices that are capable of enhancing teaching and learning. The computers are veritable tools in making the learner learn well as individuals. Computer based education says Abimbade (1999) entail the use of computers for teaching and learning which is referred to a computer Assisted Instruction and Computer Managed Instruction. For Iwu according to (2002) application of CAI involve the computer taking over a central part of instruction of the student and include different modes of instruction or interactive model with the student. These include:

Drill and Practice: The computer asks questions and seeks responses objectively from the learner using a repetitive mode. This mode of learning helps the learner to work at his own pace. It is used in Mathematics, the sciences, Language Reading etc.

Tutorials: This is used to teach a series of concepts. It is more like a programmed instruction where the student answers questions without a definite pattern. The learner goes through a series of steps and exercises with each correct answer being reinforced.

Simulations: This entails the creation of a model of a real life situation. This is used especially in areas that present dangerous situations in real life. Problems are given to the learner base on already known concepts. The student then decides what to do and the result of his actions are known.

Gaming: This is a vital tool for instruction. Learner oriented games develop logical sequencing skills, factual knowledge and problem solving. Games are good instructional tool when it is content based.

Modeling: Students are allowed to discover concepts and natural laws by manipulating ecological or environmental problems

Problem Solving: This technique is applied to provide logical and sequential order of seeking solution to a problem.

2.2.3 ICT in Classroom Settings

The main business of educational system is teaching and learning, it is through this process that students are transformed in knowledge, skills, socially, morally, ethically, politically and character-wise to enable them become useful members of the society. With the advent of ICT, some important changes are made in education. For example in teaching of mathematics formulation, calculations, trigonometry, algorithmic solutions, logarithms, square roots etc. are made easy and fast. In the same vein, language like English- spelling and syntax, correction of sentences, voice recognition are made use of at an increasing rate.

ICT is also used for the evaluation of learning outcomes and classroom management. It facilitates lesson plan, writing of students report, storage of data, collection and analysis of student's achievements. Curriculum content could be enriched through search in internet by teachers and curriculum experts.

Information, message skills, strategies and relevant school practices hitherto unknown to both students and lecturers which cannot be found in recommended textbook could easily be downloaded for information and academic development of students. Recent research findings in any subject areas are easily obtained through internet and

e-learning. This not only brings about improvement in what is taught in the classroom but also encourages personal and professional advancement. ICT encourages active participation in classroom interaction as well as facilitates the sharing of knowledge, Under the aegis of ICT, the teacher is seen as a facilitator rather than dispenser of knowledge.

2.2.4 ICT in Secondary Education

The secondary education is the type of education which learners receive after their primary education. It consists of two parts: the first being the junior secondary while the second is the senior secondary.

The National Policy on Education has as one of its goals "to enable students to live effectively in our modem age of science and technology."(NPE 2004) According to Abimbabe, the federal government launched the National Policy on Computer Literacy in 1988 at the primary, secondary and Tertiary levels. This committee stipulated the following general objectives for the nation as follows: To bring about a computer literate society in Nigeria by the mid 90s and enable the present generation of school children at different levels of education appreciate the potential of the computer and be able to utilise the computer at various aspects of life and later occupation.

To achieve these general objectives the following educational curricular content areas have been listed at the secondary school level. They serve as the framework from which syllabus for this level should be drawn. Rudimentary knowledge about information system, information processing techniques and role of the computer, exposure to the historical overview and development of modern day computer and its components, basic appreciation of how a computer works, understanding of the basic principles of operating a computer, hands-on experiences using preprogrammed packages which are relevant to the interest of the students as teaching aids in different subjects, introduction of the concept of different computer languages and their appreciation and appreciation of problem-solving methods and techniques as they apply to the computer programme design, coding and document.

The Nigerian government had in view establishing of some pilot secondary schools after which computer education will be introduced to all secondary schools. However this did not take off beyond distribution and installation of computers.

Okebukola (1997) said that there was another attempt to introduce computer education in Nigerian secondary schools in 2004. This again has not yielded the desired outcomes. He states further that the Federal Ministry of Education launched an ICT - driven project known as "NET" intended to equip all secondary schools with computers and communication technologies. Another attempt was made in June 2003 with the New Partnership for Africa Development (NEPAD) launching the e-schools initiative. This was supposed to equip all Africa High Schools with ICT equipment and connect these students to the internet as it aims at impacting on young African students. Although these efforts have been made by the federal government and some agencies yet the availability and usage of ICTs in Nigerian Secondary School level is still very low.

2.2.5 ICT and Students' Learning

A number of previous studies have shown that an appropriate use of ICT can raise educational quality and connect learning to real-life situations. Notably, it has been pointed out that learning is an ongoing lifelong activity where learners change their expectations by seeking knowledge, which departs from traditional approaches (Lowther, Ross and Morrrison, 2008) Later, they will have to expect and be willing to seek for new sources of knowledge, however, skills in using ICT will be an indispensable prerequisite for these learners since learners are actively involved in the learning processes in ICT classrooms, they are authorised by the teacher to make decisions. ICT therefore provides both learners and instructors with more educational affordances and possibilities. More specific benefits of using ICT in education are described below. Based on a constructive learning approach, ICT helps students focus on higher-level concepts rather than less meaningful tasks. Lowther et al. (2008) have stated that three important characteristics are needed to develop good quality teaching and learning with ICT: autonomy, capability and creativity.

Autonomy means that students take control of their learning through their use of ICT. In this way, they become more capable of working by themselves and with others. Teachers can also authorise students to complete certain tasks with peers or in groups. Through collaborative learning with ICT, the students have more opportunity to build the new knowledge into their background knowledge, and become more confident to take risks and learn from their mistakes.

Further, Serhan (2009) concludes that ICT fosters autonomy by allowing educators to create their own material, thus providing more control over course content than is possible in a traditional classroom setting. With regard to capability, once students are more confident in learning processes, they can develop the capability to apply and transfer knowledge while using new technology with efficiency and effectiveness. For example, in a language listening and speaking class, students may be asked to practice their pronunciation using an online audio dictionary. They are required not only to listen to the native pronunciation from the dictionary, but also to learn the definitions and examples of a new vocabulary item. They then have to make a recording of their own pronunciation and provide examples of how this new word is used in context. Before completing this task, they have to know which browser to use in order to search a suitable online audio dictionary. They will have to browse several online dictionaries, and select the one that best meets their learning needs. In addition, finding good software to record their voice is another prerequisite for these learners. Therefore, the whole learning process enriches students' learning skills and broadens their knowledge beyond what they already know. By using ICT, students' creativity can be optimized. They may discover new multimedia tools and create materials in the styles readily available to them through games (Gee, 2011), CDs, and television. With a combination of students' autonomy, capability, and creativity, the use of ICT can improve both teaching and learning quality.

2.2.6 ICT Tools in Teaching and Learning

Information and communication technology offers a variety of resources that are inevitable tools for pedagogy These tools when appropriately used in teaching and learning are very effective. 'These resources include E-mail, Online chat rooms, video conference and teleconferencing among others. Teachers make use of ICT tools to impart knowledge and skills on the learners especially in school setting. ICT equipments include computers, the internet CD-Rom, radio, television, video and cameras digital and other software (Cuban 1986). The use of ICT in teaching and learning could be visible in the following areas among others.

Mobile Phone: According to Hasselbalch (2005), mobile phones can be used as part of drive to increase the performance of academic under achievers. In Danish schools.

learners are encouraged to use their mobile phones to make notes in lesson. As part of their home work, they are encouraged to send short message servicing (SMS) text messages to other students. This phenomenon has motivated learners that hate difficulties in reading and writing. Furthermore students can use their mobile phones to write a rolling story and others build on it. Likewise some students on work experience can keep a diary on their phone which is later sent to and expanded upon on their computers. Mobile Phones according Osborne and Hennessy (2001) have the capability of presenting information in a manner that is interesting to the learner. Salinger (2004) asserts that cell phones goes a long way in helping students in solving scientific problems with the aid of illustrations and explanation of demanding concepts which ordinarily proves difficult using the traditional methods of teaching and learning. Cell Phones with internet facilities create a wider forum for problem solving such that students of Science Education have a wider forum to access and tap information with concrete examples which makes learning concrete and retentive.

Computer Games: Computer has an impact on literacy and numeracy standards among under achieving students. According to Stuart (2004) there was a marked correlation between a rise in children results and the introduction of computers in schools. Computer programmes use problem solving games to teach many concepts in mathematics and this has helped to hold the attentions of learners who have problems in classrooms activities. Computer games make learning more interesting and friendly. Other means of using information and communication technology in teaching and learning is through the use of television and radio (Perraton and Creed, 2000). Computer games present learning in a friendlier manner that is highly interesting and motivating. For instance, computer games can be used in teaching some ecological topics like “Food Chain and Web” and such makes learning retentive and changes the attitude of learners to concepts.

2.2.7 Uses of Mobile Phone as ICT Tool

Mobile Phone. The mobile phone has in-built and temporary memory that helps to store, process and access information. The teacher of English Language can exploit this in giving assignments as well as providing games for the teaching of linguistic concepts. It has a lot of potentials for school learning and also has the possibility of using the same potentials in the classrooms. Some researches have been carried out on it, while some are still going on. One of these was Johnson, Bhnna and Ur (2005) on

"Harnessing mobile technology for classroom learning", resulting in using such tasks as taking note, taking pictures, interviews and surveys of any type. At the end the information gathered on each task were downloaded to desktop and the finding was that the mobile phones had capabilities that could be harnessed for improving school learning.

Notably, it is believed that the condensed and concise ways with which information are sent using the SMS facilities of the phone could equally improve learner's skills for organisation of ideas and learning of summary in English language studies. Other areas of exploitations include using cellular phone to write stories, songs, adapting pictures or scenes of events or images outside or excursion only to bring them to the classroom for discussion with a media board in form of home work. It is used to text those absent from class to join the lesson. It motivates them to write rolling stories for other pupils to add or complete. Students separate facts from fictions thereby improving reasoning and language learning. verbal fluency and put learners at the center of learning, which in essence generates and sustains interest and enables learners stay in touch with their teachers for advice.

2.2.8 Uses of computer in teaching and learning: Computer, according to Akukwe (2003), can be defined as an electronic device that is capable of accepting, storing and processing data as well as outputting the result by following a set of instructions called a programme. Ikeonwu (2006) understands computer to mean an electronic device which accepts data (new facts or unprocessed information) and then processes it into useful information, and output or display this information via its output medium or simply stores it using its storage medium. Computer, according to Oparah (2004), ranges from analogue, digital to hybrid. Digital computers are of special interest because they are mostly used in homes, schools, offices etc. Among them are Micro-computers. These are small computers such as desktop, personal computers, laptops, calculators, notebook, sub-note book. Palmtop, GSM etc. Others are mini-computers (medium-sized computers), and mainframe computers (large computers used by scientists). According to Oparah, Chidiebere, Oguike and Osondu (2006), computers are mostly and widely used of all machines because of certain distinguishing characteristics such as speed, accuracy, versatility, reliability, large memory and storage. Educational technology according to Ike (2009) has considered two ways of using computer networks directly in learning as; Computer as tools and

Computer as teachers to replace writing on the chalkboard white board. Mann (2009), opines that instead of writing on the board, instructor or a student takes notes on the computer and projects this onto the screen so the whole class can see things. The purpose are that: it enables the students to read what has been written more easily than instructor's handwriting, this can then be saved as a record class (summary of class discussion or group work) then e-mailed to the whole class or posted on the course web page and students can work in small groups and use laptop computers to take notes on their group's discussions (replacing the use of poster paper or handwritten over-head transparencies). When they share their group's findings with the whole class, they copy their work to disk and bring it up to the front of the class to project using the instructor's computer.

Oparah, Chidiebere, Oguike, and Osondu 2006), Akukwe (2003), Uzoma 2004, Akukwe, and Uzoma (2004), Osuagwu and Agwamba 2006, and WikiEducator (2009), classified the use of computer in education as; Computer Assisted Instruction (CAD), Computer Aided Instruction (CAl) Computer Assisted Learning (CAL), Computer Based Education (CBE), Computer Based Instruction (CB1),Computer Enriched Instruction (CEI),Computer Managed instruction (CMI), and the new terminology includes, Web Based training, Web Based learning and Web Based instruction.

Benefits of using Technology in classroom: Its benefits, according to WikiEducator (2009), include: one-to-one interaction, great motivation, freedom to experiment with different options, instantaneous response/immediate feedback to the answers elicited, self pacing -allow students to proceed at their own pace, helps teachers devote more time to individual students, privacy, helps the shy and slow learner to learn, individual attention, learn more and more rapidly, multimedia helps to understand difficult concepts through multisensory approach and self directed learning – students can decide when, where, and what to learn.

2.2.9 ICT and Teacher Preparation

Teacher education must assume a leadership role in the transformation of education or be left behind in the rapid technological growth. Education is to benefit fully from ICTs in teaching-learning process. If it is essential that pre-service and in-service teachers have basic ICT skills and competencies, teacher education institutions, particularly faculties of education in universities, must provide the

leadership role for in-service teachers and model the new pedagogies and tools for learning. Through research and practice, ICT could be used effectively by both elementary and secondary school teachers (Abimbade, 1999).

Undoubtedly, our educators must be aware that educational system designed to prepare learners for an agrarian or industrially -based economy will not suffice for the knowledge and skills they need to survive the 21st century's knowledge-based economy and society. Today's global society is one in which; the world's knowledge base doubles every 2-3 years and graduates of secondary schools in industrialized nations have been exposed to more information than their grandparents were in a life-time, and there will be as much changes in the next decades as there was in the last three centuries (National School Board Association, U.S.A, 2002).

2.2.10 Integration of ICT and Teachers' Capacity Building

There are many stakeholders involved in ensuring effective integration of Information and Communication Technology (ICT) in the Teacher Education system but teachers have a particularly important role to play. According to Carison and Gadio (2002), teachers are the key to whether technology is used appropriately and effectively. Appropriate use of ICT can catalyse the paradigmatic shift from teacher-centered pedagogy to a more effective learner-centered pedagogy. Capacity building of teachers can play, major role in enabling this shift.

The teacher to a very great extent determines the quality of education all over the world. In the same vein, the importance of quality teachers in Teacher Educational system cannot be over emphasized. Therefore, capacity building of teachers is a prerequisite to effective teaching and learning. Producing competent teachers to man our classrooms therefore demand equipping them with the necessary skills needed to function effectively.

Capacity building of teachers should not merely mean to give them the ability to use ICTs or "ICT Literacy." Though this is an essential prerequisite, it is rather trivial for a policy to be limited to this. The real meaning and power of Information and Communication Technologies (ICTs) for "capacity building" would be to give the, teacher and the student the ability to use ICTs in their own processes of' teaching-learning in a manner they deem – fit arising from their engagement with ICTs.

The right conditions need to be in place before the educational benefits of ICT can be fully harnessed, and a systematic approach is required when integrating ICTs

into the education system. This fact is often overlooked and, in their eagerness to jump on to the technology bandwagon, many education systems end up with technologies that are either not suitable for their needs or cannot be used optimally due to the lack of trained personnel. Vendor persistence oftentimes overshadows calm and logical consideration of any new technology to be adopted. For example, in Malaysia, it has been pointed out that over-dependence on vendors and lack of monitoring are causing the (Malaysian) Government millions of ringgit for the rollout of various ICT initiatives' (The Star 2008). In the Philippines, the fixation with technology is demonstrated by the fact that the bulk of funding for ICT in schools projects goes to hardware and very little goes to teacher training (Arinto, 2006). This techno centric perspective on ICT in education has resulted in lack of capacity building in ICT in term of education planning and implementation. In the first issue, there is lack of capacity to systematically plan for ICT adoption. This in turn gives rise to failure to adequately provide for building the capacity of schools and education personnel to use ICT to improve teaching and learning. Thus, there is often poor implementation of ICT projects in schools. The need to build capacity in ICT integration among policymakers and teachers in Nigeria cannot be over emphasized.

2.2.11 International Initiative to support Classroom Integration of ICT NEPAD

The NEPAD (New Partnership for African Development) e-schools initiative, the Commonwealth of Learning and info Dev run in close partnership with a consortium of private sector institutions (AMD, Cisco, HP, Microsoft, Oracle) and Ministries of Education. It is a highly ambitious multi-country, multi-stakeholder initiative aiming to: equip more than 550,000 African schools with state-of-the-art computers and curriculum-relevant learning materials; connect the schools to the internet by 2020; teach ICT skills to young Africans in primary and secondary schools; provide teachers with ICT skills to enable them to use ICT as tools to enhance teaching and learning (Farrell et al., 2007). He further asserts that "the project is without precedent in terms of its international scope, socio-economic diversity and the comprehensiveness of the partnerships it comprises. NEPAD was implemented as a pilot scheme (called "Demo") in 2005-07 to start with, involving 16 African countries.

One Laptop Per Child Scheme

The most well-known portable computing initiative for developing countries globally is the One Laptop per Child (OLPC) scheme initiated by Nicholas Negroponte at the MIT Media Lab in 2005, whose mission statement is to create educational opportunities for the world's poorest children by providing each child with a rugged, low-cost, low-power, connected laptop with content and software designed for collaborative, joyful and self-empowered learning.

2.2.12 The 5J Approach to help Teachers Integrate ICT in the Classroom

Recent reports from *The Chronicle of Higher Education* and Walden University point to teachers' continuing difficulties integrating technology into classroom learning. Despite access to technology and entering the classroom with far more advanced technology skills than their counterparts of an earlier age, only 39 percent of teachers report "moderate" or "frequent" use of technology as an instructional tool (Grunwald Associates, 2010).This limited use may have multiple causes: Teachers may be overwhelmed by demands of testing; they may not see the value of instructional technologies in their particular content area; they may work in environments where principals do not understand or encourage technology use; and the types of software most helpful in instruction are not always the types of applications students know how-or want-to use. But one cause of this difficulty seems to be the types of technology-related professional development teachers receive. Though technology training is one of the most common types of professional development for teachers-with 60 percent of teachers reporting some sort of technology-related professional development in the past year (NEA, 2008)-only 43 percent rate it "useful" or "very useful." Many teachers report that the instruction they receive in technology integration, whether online or face-to-face, is still too focused on learning how to use the software versus integrating it into the teaching and learning process (NEA, 2008). Teachers do use technology-for administration, personal productivity, and displaying content (via projectors and document cameras)-but not so much as a student learning tool.

Attempt to incorporate technology in the teaching and learning environment have been on for the past two decades, yet, real classroom integration has not been fully achieved because teachers are still deficient in technology-related professional development that helps teachers use technology as part of the instructional process. In

addition, strategy that ensures teachers truly understand the benefits and appropriate uses of technology for instruction and that teachers actually use technology as part of teaching and learning has not been discovered.

In the 1990s, the Austin-based educational organisation, developed a technology professional development framework called the "5Js." The five 'J's, are: job-related; just enough; just in time ; just in case and just try it. The approach was used successfully with 150 teachers in five states to help them integrate technology into instruction and assessment. Almost all these teachers were successful in this endeavor—the number of teachers who moved from "low constructivist" to "high constructivist" use tripled after two years (Dimock, et al., 2000).

In Indonesia, where teachers' and students' technology skills are almost minimal at best, Education Development Center recently concluded two pilot technology-coaching projects in which every teacher (of approximately 280) integrated one computer into his or her classroom instruction as a part of a learner-centered activity. EDC's Indonesian technology coaches did so by utilizing 5J approach as their “playbook”. Given some of the reports we see about American teachers, more than a decade after its development in the U.S., it just might be worth dusting off and revisiting the 5Js to consider how we might improve technology-based professional development and support for teachers.

The 5Js contain little that is new. Their value is in organizing best practices in professional development under a simple mnemonic device that helps educators focus on essential practices that promote quality implementation of an innovation. The overall approach, sequential and cumulative, is grounded in two basic premises. First, if technology is used as a teaching and learning tool, tied to curricular goals and assessment and embedded within strong instructional techniques, it can promote better instruction and greater student collaboration, enhancing student learning. If not, it cannot. Second, professional development can promote quality technology integration and learning by minimizing the importance of computers within professional development and concentrating instead on the core areas of teaching: content, curriculum, instruction, assessment, and classroom management.

According to the 5Js, technology-related teacher professional development should be:

- **job-related**, focused on the core competencies of the classroom, not technology

- **just enough**, emphasizing increased comfort, not proficiency, with computers and management of limited technology resources
- **just in time**, meaning teacher are provided with skills as and when needed
- **just in case** teachers need to plan for contingencies
- accompanied by a "**just try it**" attitude, wherein instructors apply both pressure and support to compel teachers to use what they have learned.

Job-Related

The teacher's primary role is to help students understand particular subject matter. Everything else is secondary. Therefore, the focus of any computer-related professional development should not be on the technology itself, but on how computers can improve performance in these core areas of the teacher's "job." Begin with instructional objectives. What should students know and be able to do? Select appropriate technologies to support these objectives. What technologies can support these instructional objectives? How will the technology be used (with other learning tools) to do this? Gauge the effectiveness of technology in student learning. How effective is technology in supporting these learning objectives? This allows teachers to make better planning decisions around technology as an instructional tool. Make professional development workplace-based. Conduct professional development in the very environment in which the teacher will be expected to use computers in the classroom. This builds confidence that teachers can use a particular piece of software given their own constraints. It removes the "deficit" excuse of "I cannot do this in my classroom because..." Equally important, classroom-based professional development keeps technology instructors honest. If teachers cannot use technology a certain way given their physical or demographic constraints, technology instructors need to know so they can better support teachers with implementation.

Just Enough

Teachers don't need to know everything about a particular piece of software. They only need "just enough" to help them complete a curriculum-related or instructional task. Anything beyond this is wasted effort. "Just enough" focuses, not on proficiency with technology, but comfort using technology within a curriculum activity. First, teachers need only learn a few software skills to help students use the

technology. More important is understanding the software's instructional possibilities. As part of the "just enough" approach, teachers are encouraged to find their own solutions to technology issues, through trial and error, seeking help from colleagues and help guides. If this fails, only then should the technology instructor intervene and help the teacher. This approach is often unpopular while it is happening. It may take longer, but in the end, teachers report that they feel more confident once they have solved their own problems. And that is what this "J" aims for-confidence.

Next, the principle of "just enough" encompasses hardware access. Teachers often believe more is better, that more technology in a classroom will yield a more learner-centered environment, while having less hardware impedes such an environment. Limited hardware is often cited by teachers as a rationale for not attempting more collaborative approaches. In the U.S., teacher say, "I have four computers and 25 students. How am I supposed to do this?" In Indonesia, teachers say, "I have one computer and 60 students. How am I supposed to do this? "The "just enough" principles says whatever the in-class ratio of learners to computers is, it must be the same in the professional development sessions. The sessions then focus on activities that emphasize collaboration and sharing of resources. Teachers cannot and should not be trained in an environment that is richer with technology than what is in their own schools. This strategy demonstrates to teachers that scarcity of resources can actually breed, rather than impede, collaboration, and that innovation does not always depend on resources (Burns and Dimock, 2007).

Just in Time

The third 'J' is a truism in the field of professional development. Professional development should support teachers' learning just in time-when they are ready to both learn and apply what they have learned with students. The "just-in time" approach has three main corollaries. Differentiated professional development, teachers, like the students, have different learning needs and preferences. A just-in-time approach attempts to differentiate the instruction and support teachers receive so they can tailor instruction to particular students. In-class support, as the teacher plans to pilot her new instructional activity with students, the coach should provide "just-in-time" support-whether it is observation and feedback, support as an assistant, or support as a co-teacher. This "just-in-time" and classroom-based support is most useful before and as the teacher does his activity. Reduce latency; latency is often a

major issue in professional development. Too much time elapses between teacher learning and implementation of learning. By providing professional development close to the point of classroom implementation, this lag time and loss of learning is reduced.

Just in Case

The Indonesian teachers worked with many fears about computers. What if they break down? What if students break them? What if students cannot use or easily learn the software in question, particularly if the teacher also feels uncomfortable with the software? How can the teacher use one computer or two computers with 50 students? These concerns reflect larger fears about control that are not unique to teachers in one country or continent. Technology "disrupts" the classroom equilibrium based on teacher control and expertise in all matters. Limited computers mean grouping, making it harder for teachers to control the class in general and unruly students in particular. Inability to help students with software or troubleshoot a technology problem might reveal teachers to be less than omniscient. This fourth 'J' therefore focuses on helping teachers to address these issues by adopting a just-in-case attitude toward computers. This approach focuses on carefully planning the classroom activity. By remembering that computers are just one of many learning tools, teachers can reduce their chances of being caught unaware when computers fail technically or instructionally. The central tenet of just-in-case thinking is planning. By deliberately grouping students with varying technical expertise, teachers can delegate computer training to students, thus shifting some instructional responsibility to students. By working with teachers to always have a Plan B, if technology breaks down or the school's one laptop has been double-booked, learning does not grind to a halt. Technology cannot save a poorly planned learning experience. Often, it just exacerbates the weaknesses. In this just-in-case approach, technology coaches help teachers plan and organize instruction in a more careful, detailed, and comprehensive fashion. By thinking through and planning for all contingencies, teachers will always have a plan just in case technology fails.

Just Try It

Central to change is action, and this is where professional development often breaks down. "Just try it" is the most important 'J' principle of them all. Without application in the classroom, professional development is a waste of time, money, and effort. Although it is changing, most professional development programmes do not monitor or track teacher implementation of the knowledge and skills they have learned. This is particularly true for online professional development. Thus, this fifth and final 'J' focuses on getting teachers to just try the computers in their classrooms, and making sure they do through pressure, monitoring, and support. In the project in Indonesia, teachers knew that after every single professional development session, upon return to their classrooms, they would be expected to apply what they had learned and report the results to colleagues and their coaches. "just try it" can be implemented in three ways: Instituting co-teaching between the coach and teacher; Organizing solo teaching where the coach observes and provides feedback to the teacher. Creating an ongoing practice of "open lessons" where teachers carry out a technology-based activity in front of colleagues. When they "just try it," teachers know that mistakes will be made. Errors and failure are a natural part of learning. But when everyone in the school "just tries" technology, teachers can begin to help one another and build collaborative teams.

Four strategies can help to ensure that teachers "just try" technology. First, teaching the curriculum, not the technology, is the teacher's main "job" in a classroom, so any technology-related professional development should make sure that technology supports overall lesson objectives (Job-related). Next, teachers should receive instruction in technology when (not before) they need it and follow-up support to plan their technology-related activity (Just in time). Third, technology professional development should de-emphasize the importance of teachers' expertise with software and hardware (Just enough) and emphasize teachers' comfort and confidence with computers. Over the years, I have found it helpful to encourage teachers to envision themselves as project managers who set up the activity, with students as "technicians" who delve into the intricacies of the software. Finally, teachers need to carefully plan for using technology in their classroom, including strategies to address things they think might go wrong (Just in case). Only when these five 'J's come together in a systematic way might the story of technology-based trainings have a different ending.

2.2.13 Developing an ICT Curriculum Model for Secondary Education

In developing a curriculum for ICT, the Association of Secondary Schools Conference (2002) states that it is pertinent to have a model for ICT development in order to provide a framework to ICT development, there is need to identify the interrelationships of various components within a system to assist better understanding by educational administrators and policy makers. UNESCO (2002) identified two models used to provide the bases for the concept of ICT. First, ICT developed model is conceived as a continuum along which an individual school can indicate the approach that relates to the growth of ICT for their particular context.

Second, it shows different stages at which those who are most involved in the use of ICT in schools-teachers and students discover, learn about, understand and specialize in the use of ICT tools. From the foregoing, while the l model sees ICT development as a "continuum of approaches to ICT development," the 2 model referred ICT development as "stages of teaching and learning with and through ICT. The two models cooperatively provide the framework for an ICT curriculum and for the professional development of teachers.

A continuum of approaches: Researches on ICT development all over the world according to UNESCO (2002) identified about four main approaches through which educational systems and individual schools can advance their adoption and use of ICT. They include: emerging, applying, infusing and transforming that represent a continuum as indicated in the figure below.

EMERGING → APPLYING → INFUSING → TRANSFORMING

The emerging approach: At the beginning stage of ICT development, schools demonstrate emerging approach. They buy and or receive donated computers while administrators and teachers begin to explore the possibilities and consequences of using ICT for school management and adding it to the curriculum. At this stage, schools still grappled with traditional teacher-centred practices. The curriculum reflects an increase in basic skills but there is an awareness of the uses of the next approach if so desired.

The applying approach: The schools where a new understanding of the curriculum of ICT to teaching-learning has developed begin to display the applying approach. Here administrators and teachers use ICT for tasks already carried out in school management and in the curriculum. Teachers largely dominated the learning

environment. At this point, schools adapt the curriculum in order to increase the use of ICT in various subject areas with specified tools and software adoption and use of ICT. They include: emerging, applying, infusing and transforming.

2.2.14 Constraints affecting teachers Use of ICT

There are considerable barriers to the use of ICT by teachers and education practitioners. According to Abimbade (2005) the under listed reasons can be inferred from the study; teachers are sometimes unable to make use of ICT because they lack the time needed to fully prepare and research materials for teaching and many teachers are not aware of on-line or multi-media materials, technical faults with ICT equipment are likely to lead to lower levels of ICT use by teachers, lack of available technical support leads to teachers avoiding ICT for fear of a fault occurring that cannot be rectified and teaching being unsuccessful as a result, resistance to changes is a factor which prevents the full integration of ICT in the classroom, this can be seen in teachers' unwillingness to change their teaching practices and in schools or institutions finding it difficult or being unable to reorganize ways which facilitate innovative practices in ICT, psychological barriers bothering on perception and attitude toward technology, infrastructural access-electricity overcrowding and unreliable internet access to connectivity, paucity of infrastructure, human resource capacity- shortage of technical experts and skills, lack of professional training, lack of adequate funding and sometimes total dependency on donor countries.

2.2.15 Problems of Utilization of ICTs in Schools

Institutions of learning are looked upon to equip students with the 21st century skills necessary to ensure their employability and relevance in the society, to enable them contribute to national development. However, there has been low utilization of ICT facilities and services in our school system as a result of issues bordering on finding, security, infrastructure, planning and accessibility among others. Some of the problems affecting the implementation of ICT policy in our schools and its effective utilization by teachers are:

Lack of infrastructural facilities:

Infrastructural facilities at both the primary and secondary levels are inadequate, classroom space are not enough to accommodate the ever increasing

population of pupils/students. Most schools lack accommodation to house computer studios and in most cases these schools do not have access to electricity. Anyebe (2008) opines that ICT integration requires a power supply devoid of frequent fluctuation that could cause damage to ICT equipments which are mostly hypersensitive to power surge. ICT facilities are lacking in most of the schools, the ratio is 1:70 where they are in existence and perhaps not functional.

Lack of capacity building: Most of the teachers are computer illiterates and therefore lack the interest and willingness to use ICT in the classroom as part of their normal working tools. Such teachers hardly encourage students to keep abreast with changes in the society since they can only teach the students what they know.

Poor funding of schools: Budgetary allocation to the educational sector is hardly enough to cater for the increasing demands of the school system. The cost of acquiring and maintaining ICT facilities are very expensive and not within the reach of headmasters and principals of schools. Iweh (2008) maintains that the cumulative effects of inadequacy of funding of education had manifested in accommodation problems. Inadequate facilities and equipment, instructional delivery problems and professional growth problem. These problems have a negative impact on quality of teaching and learning.

Problem of supporting staff: Technical support staff for the maintenance of ICT facilities is lacking. This problem accounts for the abandonment of ICT facilities in schools following a minor technical problem.

2.2.16 Teachers' Attitudes and Computer Prior Experience

Dupagne and Krendl (1992) noted that computer prior experience often fosters positive attitudes towards integration; moreover, the lack of computer instruction often accounts for teachers‟ low confidence level when they initiate computer activities. This feeling of low confidence often results in high anxiety towards computers. High anxiety can lead to negative attitudes and eventually negatively influence the learning process. Computer prior experience has been the most commonly cited variable correlated to positive attitudes (Yıldırım, 2000). For example, Woodrow (1992) reports correlations between computer prior experience and attitudes toward technology. Chou (1997) also highlighted that computer prior experience influenced teacher attitudes toward computers. Ropp (1999) found that

there is significant relationship between computer access and hours of computer use per week and computer attitudes.

Christensen (1998) states that teachers‟ attitudes toward computers affect not only their own computer prior experiences, but also the experiences of the students they teach. In fact, it has been suggested that attitudes towards computers affect teachers‟ use of computers in the classroom and the likelihood of their benefiting from training. Positive attitudes often encourage less technologically capable teachers to learn the skills necessary for the implementation of technology-based activities in the classroom.

Cavas and Kesercioğlu (2003) investigated the science teachers‟ attitudes toward computer assisted learning (CAL). The results showed that the majority of science teachers had positive attitudes toward CAL and no gender difference exists between science teachers‟ computer-assisted learning attitudes. Ocak and Akdemir (2008) expressed that science teachers‟ computer literacy level is related to their computer use. And also computer literacy level of the teachers increases their integration of computer applications in their teaching. In the study, most of the teachers use Internet, email, and educational software CDs as computer applications in the classrooms. They found statistically differences in the integration of computer applications as an instructional tool.

A large number of studies showed that teachers‟ computer prior competence is a significant predictor of their attitudes toward computers (Na, 1993; Berner, 2003). Al-Oteawi (2002) found that most teachers who showed negative or neutral attitudes toward the use of ICT in education lacked knowledge and skill about computers that would enable them to make informed decision.

A major obstacle to successful technology integration was the lack of teacher confidence and skill when using technology (Zammit, 1992). Supporting this result, in the study of Akpınar (2003) where he studied the level of primary and secondary school teachers‟ using the technological opportunities, it is concluded that half of teachers do not use computers for educational purposes in activities outside the classroom and almost half of them never use computer software in educational activities. Again in another study (Erdemir, Bakırcı & Eyduran, 2009), pre-service teachers state that they do not feel themselves adequate for using internet and computer for the purpose of teaching, while they feel that they are adequate for using

search engines; they can prepare basic materials for teaching but not complex and multi-purpose educational devices

2.2.17 ICT-based Instruction and teachers' Attitude to Integration of ICT

Traditional approaches to teaching and learning have been challenged by new and innovative approaches based on the latest advances in computer and Internet technology. The vast resources and opportunities that computers and Internet provide have brought about new tools, approaches, and strategies in teaching and learning. The success of any initiatives to implement technology in an educational programme depends strongly upon the support and attitudes of teachers involved. It has been suggested that if teachers believed or perceived computers not to be fulfilling their own or their students‟ needs, they are likely to resist any attempts to introduce technology into their teaching and learning (Askar & Umay, 2001).

It is important to understand the biases and stereotypes that teachers may hold about the use of computers and the factors that act as facilitators to teachers‟ positive computer usage. Of the factors that have been listed to affect the successful use of computers in the classroom are teachers‟ attitudes towards computers and these attitudes, whether positive or negative, affect how teachers respond to technologies. This in turn affects the way students view the importance of computers in schools (Teo, 2006) and affects current and future computer usage.

In support of the importance of teachers attitude towards computer use, Zhao, Tan and Mishra (2001) provided evidence to suggest that the attitudes of teachers are directly related to computer use in the classroom. For example, teachers often view the computer as a tool to accomplish housekeeping tasks, manage their students more efficiently, and to communicate with parents more easily. The success of student learning with computer technology will depend largely on the attitudes of teachers, and their willingness to embrace the technology (Teo, 2006). Gaining an appreciation of the teachers attitudes towards computer use may provide useful insights into technology integration and acceptance and usage of technology in teaching and learning.

No matter how sophisticated and powerful the state of technology is, the extent to which it is implemented depends on teachers having a positive attitude towards it (Huang and Liaw, 2005). An attitude is defined as "a relatively enduring organization of beliefs, feelings, and behavioural tendencies towards socially

significant objects, groups, events or symbols" (Hogg & Vaughan, 2005). In the educational environment, attitudes expressed by teachers as well as students play an important role in the achievement of educational objectives. Specifically with regard to the use of new innovations in the classroom, traditional teaching methods are being forced to accommodate what are sometimes incommensurate information technologies. The attitudes of teachers play a prominent role in educational interaction as well as instructional choices and as such are fundamental in examining the outcome of technological integration in the classroom (Becker, Ravitz, and Wong, 1999; Albion and Ertmer, 2002).

Albarracin et al., (2005) mentioned that an attitude is a mental or neural state of readiness, organised through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related. His definition, though is complex, emphasises two crucial aspects that contribute a lot in understanding the concept of attitude. In their definition, Fishbein and Ajzen (1975), emphasises the learned nature of attitudes: "An attitude is a learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object.

Attitude is a predisposition to respond favorably or unfavorably to an object, person, or event (Ajzen, 1988). To successfully integrate technology in the classroom depends strongly on the teachers' attitudes. It is believed that if teachers perceived technology programmes as neither fulfilling their needs nor their students' needs, it is likely that they will not integrate the technology into their teaching and learning.

Among the factors that influence successful integration of ICT into teaching are teachers' attitudes towards technology (Hew and Brush, 2007). Tella (2007) found that computer use was predicted by intentions to use and that perceived usefulness was also strongly linked to these intentions. If teachers' attitudes are positive toward integration then they can easily provide useful insight about the adoption and integration of ICT into teaching and learning processes.

Becta (2004) claims that one key area of teachers' attitudes towards the use of technologies is their understanding of how these technologies will benefit their teaching and their students' learning. Drent and Meelissenet et al (2007) conducted a study about factors which stimulate or limit the innovative use of ICT by teacher educators in the Netherlands. Their findings showed that several factors such as a student–oriented pedagogical approach, a positive ICT attitude, computer prior

experience, and personal entrepreneurship of the teacher educator have a directs positive influence on ICT integration. Also, comparison between these factors in predicting computer use identified that attitude toward computer contributed more in explaining classroom integration. Similarly, Teo (2008) conducted a survey on pre-service teachers' attitude, perceived usefulness, perceived control, and behavioral intention to use the computer. The researcher found that teachers were more positive about their attitude towards computers and intention to use computer than their perceptions of the usefulness of the computer and their ability to use computer.

Video presentation of ICT-based instructional approach is another way of training teachers in daily classroom integration of ICT as part of teaching methods in teaching and learning process. It involves exposing teachers to ICT-based training that can facilitate classroom integration of ICT through well planned video presentation. Video presentation was used among teachers in the United State of America.

According to Jung (2005), videotape and CD-ROM were used to help US teachers view how technology can be integrated into their work. The video presentation is made up of stories about teachers who are making meaningful and creative uses of technology in their instruction. These video clips contain video descriptions and demonstrations of how technology is used in the classroom. It was reported to have influenced teachers' attitude toward classroom use of ICT. The use of this mode of ICT-based training programme is rare in Nigeria especially among basic technology teachers and where they are available they are not accessible because of copyright restriction. In this study, the researcher and participants in the experimental groups produced video clips that contain video descriptions and demonstrations of how classroom integration of ICT in basic technology in Nigeria can be facilitated and made available to other users. An extensive research review by Balanskat, Blamire and Kefala (2006) observe that teachers' practice is not changing much when they use ICT in the classroom and also report that teachers with highly positive perceptions of ICT have better attitude towards its classroom integration.

2.2.18 Influence of Teachers' Computer Attitude on their Attitude to Integration of ICT

Teachers' computer attitude can be defined as teachers' predisposition to respond favourably or unfavourably to use of computer for specific or personal purpose. The strong relationship between computer related attitudes and ICT

integration in teaching and learning has been emphasised in many studies (Van Braak, 2001). Yuan and Ma (2001) who used the Chinese Computer Attitude Scale for Teachers (CAST) report that affective attitudes, general usefulness, behavioural control and pedagogical use are significant in determining use of ICT. Myers and Halpin, (2002) observe that the major reason for studying teachers' attitude toward computer use is that it is a major predictor of future computer use in the classroom.

This finding corroborates Kumar and Kumar (2003) who report that most teachers believe the level of computer experience has a positive effect on attitude towards computers.

Positive computer attitudes are expected to foster ICT integration in the classroom (Van Braak , Tondeur and Valcke , 2004). The success of any initiative to implement technology in an educational programmes depends strongly upon the support and attitudes of teachers, beliefs or perceived proposed computer programme as fulfilling neither their own or their students' needs, they are not likely to attempt to introduce technology into their teaching and learning. Across the globe, teachers' roles and power of influence can not be undermined in the successful integration of ICT (Albrini , 2004). In the same vein, the level of success in ICT integration in schools is not dependent on quality or sophistication of the technology, but rather on teachers' readiness and positive disposition (Deniz , 2007).

Sang, Valcke, Van Braak, and Tondeur, (2009) also discover that computer attitude influenced ICT integration in the classroom. Much of the early research on using ICT in education has explored technical competence rather than teachers' attitudes and motivation to using ICT (Gulbahar and Guven 2008). However, these studies did not involve basic technology teachers and were conducted over a long time ago, hence the need to involve basic technology teachers and to find out whether these findings are still true. Computer Attitude is classified into two, namely Positive and Negative. However, these studies were not conducted in Nigeria and where the studies were conducted basic technology teachers were not involved hence the need to replicate this study among basic technology teachers in Nigeria.

2.2.19 Teachers' Gender and Attitude toward ICT integration

There are several conflicting research findings on gender differentials on use and attitude toward ICT integration. Venkatesh and Moorris (2000), report that gender was one of the factors that influence individual adoption and usage of technology in the workplace. Further, a study conducted in four African countries report that when given the same opportunity, gender equity does not exist in practice in terms of computer use among boys and girls (Derbyshire, 2003).

Alaba (2010) also reports that gender correlated significantly and positively with attitude towards ICT..Whereas, other researchers have reported the lesser impact of gender when the interaction between a variety of variables is taken into account; e.g., teacher efficacy, computer efficacy, and computer attitudes of teachers (Gencer and Cakiroglu, 2007; Liao, 1998; Riggs, 1991).It is not surprising that gender of teachers has no direct effect on their prospective ICT integration. This finding is in line with previous findings in Western settings and Eastern settings. For instance, Shapka and Ferrari (2003) did not observe any gender differences in computer-related attitudes of teacher candidates in Canada.

Yuen and Ma (2002) also found no significant gender differences in undergraduate trainee teachers' attitudes in Hong Kong towards ICT integration. The same results were found with in-service teachers. For instance, Hong and Koh (2002) found no significant differences between male and female teachers in overall computer anxiety levels and overall attitudes. Birisci and Karakas (2009) and Yusuf and Balogun (2011) also report that there was no significant difference between male and female teachers' attitude to ICT integration. However, pre-service teachers were used hence the need to involve in-service teachers in a similar study. Findings of this study would provide empirical support to resolve these conflicting reports.

2.2.20 ICT-based Instruction and Students' Achievement in Basic Technology

ICT-based instruction can be defined as instructional delivery facilitated with use of ICT-tools while achievement refers to students' academic performance in basic technology examination. ICTs such as videos, television and multimedia computer software that combine text, sound, and colourful moving images can be used to provide challenging and authentic content that will engage the students in the learning

process. Interactive radio likewise makes use of sound effects, songs, dramatizations, comic skits, and other performance conventions to compel the students to listen and become more involved in the lessons being delivered. Further, ICTs are said to help expand access to education, strengthen the relevance of education to the increasingly digital workplace, and raise educational quality. Research has shown that, on average, students who used ICT-based instruction scored higher than students without computers (Kulik, 2003)

ICT-based instruction can be in form of CAI, CAL,CBE and CBT. Researchers have identify defective teaching strategies as one of the reasons for the poor achievement of students' in science and non- science subjects (Okebukola and Jegede ,1997). (Abimbade,1996) and (Udousoro and Abimbade,1997) report that use of computer improve students' achievement in Mathematics and physics, Ajelabi (1998) and Udousoro (2000) used the same CAI package to teach Mathematics and Social Studies respectively. Onasanya, Daramola and Asuquo (2006) indicate that there is no significant difference between the performance of the students exposed to CAI package and those exposed to the conventional method of instruction. Onasanya, Fakomogbon, Shehu and Soetan (2010) also report that use of CAI improve students' achievement in introductory technology. This finding is in contrast with findings of previous studies. This might be attributed to the fact that the sample used was very small and there is need to resolve these conflicting reports. Research work intended to enhance students' achievement in some school subjects have been conducted. For instance, Akorede and Adefuye (2011) observe that ICT-based instructional resources improved students' achievement in basic technology but the study was limited to one Local Government Area. Further, unlike other school subjects, studies investigating effects of ICT-based instruction on students' achievement in basic technology is rare, therefore there is need to investigate effects of ICT-based instructional approach on students' achievement in basic technology using large sample to verify the contradiction.

2.2.21 ICT-based Instruction and Students' Attitude to Basic Technology

On the other hand, students' attitude can be defined as their disposition to basic technology as a school subject. Kulik,(2003) reports that students learned more in less time and liked their classes more when taught using ICT-based instruction.

However, Lee (2001) reports that if CAI materials are developed and implemented in an effective way, students' attitude increases in science lessons. Salih Capri, Erol Tas and Sacitkose (2006) also reported that CBI influences students' attitudes towards science lessons in a positive way but attitude changes have not occurred. Further, unlike other school subjects, studies investigating effects of ICT-based instruction on students' attitude toward basic technology is rare. Hence, there is need to investigate effects of ICT-based instruction on students' attitude towards basic technology and to verify the conflicting reports of previous studies.

2.2.22 Students' Gender and their Achievement in Basic Technology.

Students' gender can be defined as classification of students' into male or female while achievement refers to students' scores in Basic Technology examination. Gender is one of the variables that influence students' achievement in school subjects, but there are conflicting reports. For example, Abdulahi (1982) reports that there is no gender difference in male and female achievement in Basic Science. Also, Onansanya, Daramola and Asuquo (2006) report that there is no significant difference between the performance of male and female students in introductory technology when exposed to different modes of CAI. On the other hand, Onasanya, Fakomogbon, Shehu and Soetan (2010) also report that there was no significant difference in achievement of male and female students in introductory technology when taught with use of ICT software while Orahi, Uhumugvbi and Aguele (2010) discover that male have better achievement in science subjects than female students. Oludipe (2012) report that there is no gender difference in male and female achievement in Basic Science. However, the sample used was small and the study covered only one local government area which makes it necessary for further investigation. This present study will involves large sample and three local government areas will be covered.

2.2.23 Students' Gender and Attitude to Basic Technology

Attitude towards basic technology is defined as disposition of students to teaching and learning of Basic Technology which is one of the VTE subjects. Gender is one of the variables that influence attitude toward school subjects. However, Ossi, Heikki and Jenni (2007) observe that both male and female are attracted to technology education because they enjoy working with their hands and have flare for

creativity. The study did not show that anyone of the two groups have negative attitude and in addition, the study did not focus specifically on Basic Technology. Hence, there is need for further investigation. Oriahi, Uhumugvbi and Aguele (2010) in a separate study observed that male have more positive attitude to science education than female students. In a study on influential factors affecting students' attitude toward VTE subjects in Secondary Schools in Southeastern Nigeria, Ozioma (2011) indicate that gender is one of the variables that influence students' attitude toward VTE subjects. It was observed that male have positive attitude to VTE subjects than female students. However, the researcher focused on VTE generally, hence the need to examine Basic Technology as a specific subject in this study.

2.2.24 Students' Computer Attitude and their Achievement in Basic Technology

Computer attitude is defined students' disposition to use of computer in learning environment. Computer attitude is classified into positive and negative. Students are said to have positive computer attitude when they have favorable disposition to use of computer in the learning environment while they have negative attitude when they have unfavorable disposition to use of computer in the learning environment. Among few studies on relationship between students' computer attitude and achievement in school subjects, Tsai and Tsai (2003) observe that students with better achievement tend to possess positive computer attitude. He further indicate that students' who have good learning strategies especially the strategies of information processing, selecting main ideas and test strategies are inclined to have more positive computer attitude . This implies that students with good achievement in school subjects are likely to have positive computer attitudes.

2.2.25 Students' Computer Attitude and Attitude to Basic Technology

Motivated students with good time management have been found to have positive computer attitude (Tsai and Tsai, 2003). This implies that students with positive attitude toward school subjects are likely to have positive computer attitude. However, studies that investigate students' computer attitude and learning outcomes in school subjects especially in basic technology are very rare hence, the need to examine relationship between computer attitude and learning outcomes among Basic

Technology students. Further, most of the few studies on students' computer attitude and learning outcomes were not conducted in Nigeria hence, the need to carry out the study among samples in Nigeria.

2.3 Appraisal of Literature Review

Based on the findings of most researchers, there are strong indications that classroom integration of ICT can promote and contribute to those factors that can transform the learning environment and influence learners positively to learn (Kulik, 1994; Lee, 2001; Salih Capri, Erol Tas and Sacitkose, 2006). However, they have not been able to find out specific ways of integrating ICT into daily classroom practice. Most of the studies conducted on ICT teacher training posited that it is one of the ways to facilitate use of ICT in the classroom and four forms of ICT teacher training have been identified. However, there have been no much study to identify which of the four forms of ICT teacher training programmes would bring best result as teachers reported that they have not had adequate training to prepare themselves to use technology effectively in the classroom. Generally, the review of literature in ICT teacher training programmes show that lack of professional development for technology use is one of the serious obstacles to fully integrate ICT in the classroom

Most ICT training workshops did not provide enough opportunity for teachers to practice their newly acquired skills and fail to provide continual follow up support for teachers. Although, some of the staff development programmes in ICT may have been considered successful, the improvement is only incremental. In view of the fast changing world especially in the field of ICT, such incremental improvement is no longer adequate. Therefore, there is need to redefine and redesign our ICT training programmes in order to effectively help teachers to acquire knowledge ,skill and better mindset in dealing with the fast changing ICT.

Most of the studies on factors that influence students' learning outcmes in basic technology at JSS levels did not focus on effect of ICT-based instructional approach on students' achievement and their attitude toward basic technology. Findings from few studies that focus on effects of ICT-based instructional approaches on students' achievement and attitude toward basic technology involves use of CAI while most of the other studies have reported conflicting findings which perharps, might be due use of small samples and in adequate goegraphical scope.Hence, this

study investigated effects of ICT-based instructional approach on in-service basic technology teachers' attitude toward ICT integration on one hand and students' achievement in and attitude towards basic technology on the other hand while the moderator effects of computer attitude and gender of both basic technology teachers and students will be examinned.

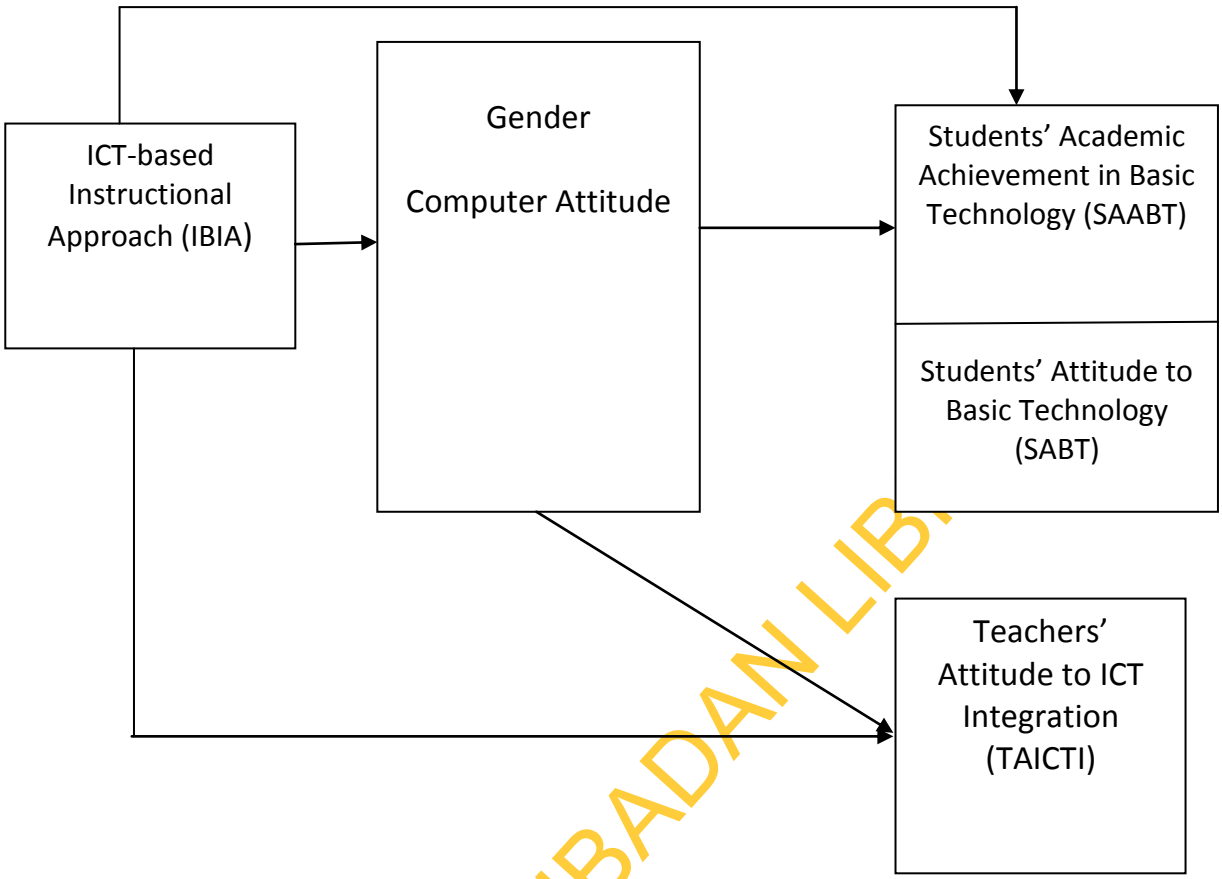


Fig. 2.4: Diagrammatic Representation of the Conceptual Model

The conceptual model is based on Technology Acceptance Model (TAM) developed by Davis, Bagozzi and Warshaw (1989). It was designed to investigate the reasons why some people use technology and their attitude towards it. This conceptual model links the perceived usefulness and ease of use with in-service basic technology teachers' attitude towards classroom integration of ICT. This conceptual model provide links to understand and explain teachers' attitude towards classroom integration of ICT in basic technology classrooms when exposed to ICT-based instructional approach (treatment).When teachers are exposed to integration of ICT in basic technology classrooms, by exposing them to ICT-based instructional approach (treatment), there is need to determine their level of attitudinal change.

The model also provide links that can provide explanation on effects of ICT-based instructional approach, when used by teachers' on students academic achievement in and attitude towards basic technology. In addition, when the teachers integrate ICT in basic technology classrooms by exposing `students to ICT-based

instructional approach (treatment) there is need to determine its effects on their learning outcomes.

The model also provide links that can explain the influence of students' gender and computer attitude on their learning outcomes in basic technology as well as links that can explain the influence of teachers' gender and computer attitude on their attitude towards classroom integration of ICT. Notably, the influence of students' gender and computer attitude on their learning outcomes in basic technology as well as teachers' gender and computer attitude on their attitude towards classroom integration would be examined.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter deals with research methodology, presented as stated in the following structure: Research design, variables used, population, sample, instruments, validation and reliability, procedure for data collection and method of data analysis.

3.2 Research Design

There are two phases in this study; the first entails exposing basic technology teachers to treatment while the second is exposing basic technology students to another form of treatment.

The research design adopted for the two phases of the study is the pretest- posttest, control group, quasi-experimental design. The design was considered appropriate for the study because it enabled the researcher expose participants to treatment. The pre-test was essential as it determined the entry behaviour of the participants while the post-test determined the effects of the treatment.

The design is illustrated thus:

Teachers

Experimental Group E1: O_1 X_1 O_3

Control Group : O_2 X_2 O_4

Where: O_1 and O_2 are pre-test observations for teachers in experimental and control groups respectively, O_3 and O_4 are post-test observations for teachers in experimental and control groups respectively.X_1 and X_2 represent the ICT-based and modified conventional instructional approach

Students

Experimental Group E1: O_5 X_1 O_7

Control Group : O_6 X_2 O_8

Where: O_5 and O_6 are pre-test observations for students in experimental and control groups respectively, O_7 and O_8 are post-test observations for students in experimental and control groups respectively.X_1 and X_2 represent the ICT-based and modified conventional instructional approach.

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This study also adopted a 2x2x2 factorial matrix in each of the two phases. The first phase is made up of instructional approach at two levels (ICT-based and conventional approach), teachers' computer attitude at two levels (Positive and Negative attitude) and gender at two levels (male and female).The second phase is made up of instructional approach at two levels (ICT-based and conventional instructional resources), students' computer attitude at two levels (Positive and Negative attitude) and gender at two levels (male and female).

The factorial matrix for each of phase is presented below:

Table 3.1: 2 x 2 x 2 factorial matrix

Treatment	Gender	Computer Attitude	
		Positive	Negative
Experimental Group	Male		
	Female		
Control Group	Male		
	Female		

3.3 Variables in the study

The independent variable in the first phase is the mode of instructional approach at two levels:

(i) ICT-based Instructional Approach (IBIA)

(ii) Conventional Instructional Approach (CIA).

The moderator variables in this study are:

Teachers' Computer Attitude

a) Positive

b) Negative

Teachers' Gender

a) Male

b) Female

The dependent variable is:

(i)Teachers' Attitude to Classroom Integration of ICT

The independent variable in the second phase of this study is the mode of instructional approach at two levels:

(i) ICT-based Instructional Resources (IBIR)

(ii) Conventional Instructional Resources (CIR).

The moderator variables are:

Students' Computer Attitude

c) Positive

d) Negative

Students' Gender

c) Male

d) Female

The dependent variables are:

(i) Students' Academic Achievement in Basic Technology

(ii) Students' Attitude towards Basic Technology

3.4 Population

In the first phase, the population consisted of basic technology teachers while the second phase consisted of students in JSS, Ogun State, Nigeria.

3.5 Sample and Sampling Technique

In the first and second phase of the study, 29 basic technology teachers and six intact classes of 205 students respectively were involved. In the first phase, multi-stage and purposive sampling techniques were used to select basic technology teachers from 12 JSS in three Local Government Areas .Ogun State was stratified into three Senatorial districts in which Ijebu-East Senetorial district was randomly selected. Twelve JSS from three LGAS out of nine in the Senetorial district were randomly selected for the study. In the second phase, basic technology students were randomly selected from six schools in the three LGAs selected for the study. Two schools were randomly assigned to control and experimental groups in each of the three LGAs covered.

Computer prior experience has been considered as one of the factors that influenced integration of ICT and the method employed in this study is to assign in-service basic technology teachers with some degree of computer prior experience to

experimental and control groups. The computer prior experience is classified into three levels (low, medium and high) while in-service basic technology teachers with medium and high computer experience were involved in the study. The second phase of the study involved basic technology students in JSS. These students (JSS II) were used for the study because they have offered basic technology as a subject for at least one year and they would have formed a peculiar attitude towards the subject and they were not preparing for any external examination. A school was considered eligible to participate in the study if it:

(i) has Basic Technology as one of the pre-vocational subjects on the school time table.

(ii) has qualified Basic Technology teachers with computer prior experience teaching the subject.

(iii) has computer laboratory with at least four functional computers and at least one computer instructor.

(iv) Is a public Secondary School.

(v) it has generator.

3.6 Research Instruments

In the first phase, three instruments which comprised one stimulus and two response instruments were used. The stimulus instrument was used for intervention while the response instruments were used for data collection.

Stimulus Instrument

(1) Instructional guide on Instructional Approach (IIAT)

(i) ICT-based Instructional Approach for Teachers (IAT).

These are video presentation of instructional resources for teaching and learning selected topics in basic technology.

(ii) Conventional Instructional Approach (CIA)

Response Instruments

(1) Teachers' Attitude to ICT Integration

(2) Teachers' Computer Attitude Scale

While in the second phase, four instruments which comprised one stimulus and three response instruments were used. The stimulus instrument was used for intervention while the response instruments were used for data collection.

Stimulus Instrument

(1) Instructional guide on Instructional Approach for Students (IIAS)

(i) ICT-based Instructional Approach(IBIA)

(ii) Conventional Instructional Approach (CIA)

Response Instruments

(1) Students' Academic Achievement Test in Basic Technology (SAATBT)

(2) Students' Attitude to Basic Technology Inventory (SABTI)

(3) Students' Computer Attitude Scale (SCAS)

3.6.1 In-service Teachers' Attitude toward Classroom Integration of ICT Scale (ITACIICTS)

ITACIICTS was designed by the researcher. It consisted of 15 items in which items 1-10 were on teachers' attitude to the use of ICT for information (content of an instruction) acquisition and items 11-15 were on the use of ICT for information (content of an instruction) dissemination. The items were based on four point Likert scale with Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) while the scoring are 4,3,2, and 1 respectively for positively worded items and negative items were reversed. The participants ticked (√) option that corresponds to their opinion (Appendix IV).

3.6.2 Validation and Reliability of ITACIICTS

Six copies of the instrument were given to experts from Educational Technology Unit of Teacher Education Department University of Ibadan, Ibadan, Guidance and Counseling Department, and from ICT centre, Tai Solarin University of Education, Ijebu-Ode.The lecturers were also charged with the responsibility of assessing the suitability of the instrument for the teachers in terms of language and clarity of terms and if it applicable to the investigation. The revised version of the instrument was administered to 20 representative samples of the population that were not part of the study. The data collected were analysed using Cronbach alpha method with reliability coefficient of 0.81 which was found suitable and appropriate for the study.

3.6.3 In-service Teachers' Computer Attitude Scale (ITCAS)

ITCAS was developed by Selwyn (1997) and adapted by the researcher. It consisted of 21 items of which 1-6 were on affective component of the scale, 7-11 were on perceived usefulness component of the scale, 12-17 were on perceived control component of the scale, while 18-21 were on behavioural intention component of the scale. The items were based on four point Likert scale with Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD), scored 4,3,2, and 1 respectively for positively worded items, and negative items were reversed. The participants ticked (√) options that corresponded with their opinions (Appendix V).

3.6.4 Validation and Reliability of ITCAS

The instrument was used by Sexton, King, Aldridge and Goodstadt (1999) and they reported that the ITCAS possessed high reliability (alpha = 0.90). The instrument was administered to 20 representative samples of the population that were not part of the study. The data collected were analysed using Cronbach alpha method with reliability coefficient of 0.80 which was found appropriate for the study.

3.6.5 Students' Academic Achievement Test in Basic Technology Inventory (SAATBTI)

The Students' Academic Achievement Test in basic technology consisted of 33 multiple choice items (A-D) designed by the researcher to measure achievement in the subject at JSS 1I level. Items 1-7 of SAATBTI were set on definition of maintenance, 8-13cleaning aspect of maintenance, 14-19 dusting aspect of maintenance, 20-25 washing aspect of maintenance 26-31 washing oiling aspect of maintenance and 32-33 measuring replacement aspect of maintenance.

Table 3.2: Table of specification

Topics	Knowledge	Comprehension	Application	Total
Maintenance	3	2	2	7
Cleaning	2	2	2	6
Dusting	2	2	2	6
Washing	2	2	2	6
Oiling	2	2	2	6
Replacement	1	1		2
Total	12	11	10	33

The face validity of the test was done by giving a 50-item test to five lecturers in Tai Solarin University of Education, Ijebu-Ode, who are versed in test in construction and development to judge the validity of the test. This is to certify the test items are suitable in terms of language, clarity and breadth. Also, the judges ascertained its suitability for the target population. They were also charged to ensure that the content validity of the test is in line with of specification attached to it. This finally resulted into 45 items achievement test.

The 45- test items achievement test was administered to JSS II intact class students of Adeola Odutola College, Ijebu-Ode. . Also, a field trial of the instrument was carried out on randomly selected JS 1I students that were not part of the main study. When subjected to item analysis, 12 items were found to have negative correlations with the entire test. These 12 items were expunged reducing the number of items to 33. In each case, the students were expected to tick (√) the correct answers (responses) to the questions on the question paper. Correct response to SAATBT in the six topics respectively was awarded three marks each making a total of 99 marks to be converted to 100% (Appendix VI).

3.6.6 Validation and Reliability of SAATBT

This instrument was administered to a group of twenty students who had similar characteristics with the subjects of this study but were not part of the main

study. The data collected were analysed using KR-20 formula, the results were 0.76 and with difficulty index of 0.49.

3.6.7 Students' Attitude toward Basic Technology Inventory (SATBTI)

This instrument was designed by the researcher to measure Basic Technology students' attitude to the subject. It consisted of 15 items with four- point Likert scale, Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) with scoring of 4,3,2, and 1 for positively worded items, and negative items were reversed. The students ticked (√) options that corresponded with their opinions (Appendix IX).

3.6.8 Validation and Reliability of SATBTI

The instrument was validated for construct and content validity by two psychologist, peer and experts review. The instrument was given to three experts in the field of Technical Education at Tai Solarin University of Education, Ijagun. Their corrections and suggestions were used to improve the instrument. This instrument was administered to a group of 20 students who have similar characteristics with the subjects of this study but were not part of the main study. The data collected were analysed using Cronbach alpha method with reliability coefficient of 0.79, found appropriate for the study.

3.6.9 Students' Computer Attitude Scale (SCAS)

This instrument (SCAS) was developed by Selwyn (1997) and adapted by the researcher. It consisted of 21 items in which 1-6 were on affective component of the scale, 7-11 were on perceived usefulness component of the scale, 12-17 were on perceived control component of the scale, while 18-21 were on behavioural intention component of the scale. The items are based on four- point Likert scale with Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) scored 4,3,2, and 1 respectively for positively worded items, and negative items were reversed. The participants ticked (√) options that corresponded with their opinion (Appendix X).

3.6.10 Validation and Reliability of SCAS

The instrument was used by Sexton, King, Aldridge and Goodstadt (1999) and they reported that the ITCAS possessed high reliability (alpha = 0.90).The instrument

was however re-administered by the researcher to 20 representative samples of the population not part of the study. The data collected were analysed using Cronbach alpha method with reliability coefficient of 0.87 which was found appropriate for the study.

3.6.11 Video Package of ICT-based Instructional Materials (VPIIM)

(i) VPIIM was designed by the researcher assisted by experts in the field of computer. It contained instructional materials on simple maintenance and maintenance of domestic appliances with sub-topics recorded on DVD. The topics covered were taken from 9-Year Basic Education Curriculum for Basic Technology for Junior Secondary II. The topics were:

- Simple Maintenance
- Maintenance of Domestic Appliances

Sub-topics

- Dusting
- Cleaning
- Washing (plates, Cups, Cutlery).
- Washing (Cooking pots)
- Replacement of damaged parts was taught using basic technology teachers who used discussion method to teach the students. After classroom discussion of each topic, there was video presentation of ICT-based instructional materials to the students (Appendix II).

3.6.12 Validation of VPIIM

The recorded DVD was given to experts in Educational Technology, basic technology teachers, the supervisor, and some lecturers in the Faculty of Education for review. The format for review was on clarity, suitability of the language, and appropriateness of the content, grammatical expression and the voice. This was done at every stage of the recording before the final production.

3.6.13 Instructional Materials for Conventional Instructional Approach (IMCIA)

(i) IMCIA was designed by the researcher assisted by experts in Educational Technology. It contained instructional materials on wall charts on simple maintenance and maintenance of domestic appliances with sub-topics captured on wall charts. The topics covered were taken from nine -Year Basic Education Curriculum for Basic Technology. The topics were:

- Simple Maintenance
- Maintenance of Domestic Appliances

The lessons were taught using Basic Technology teachers with conventional method to teach the students. After classroom discussion of each topic, there was wall chart presentation of instructional materials to the students (Appendix IIC).

3.6.14 Validation of IMCIA

The wall chart was given to experts in Educational Technology, basic technology teachers, the supervisor, and some lecturers in the Faculty of Education for review. The format for review was on clarity, suitability, and appropriateness of the content. This was done at every stage of the production before the final production.

3.6.15.The Lesson Guide

The six lesson guides (one for each topic) were based on the nine -year Basic Education Curriculum for Basic Technology for Junior Secondary II. The teachers in the experimental groups and the control group used these lesson guides. The teachers used and strictly followed the lesson guides to teach the pupils during the Basic Technology lessons. In the experimental group, there was video presentation of ICT-based instructional materials to the students after classroom discussion of each topic. In the control group, there was only wall chart presentation of ICT-based instructional materials to the students after classroom discussion of each topic. The lesson guides gave the teachers a uniform standard to work with (Appendix IV)

3.6.16 Validation of the Lesson Guide

The lesson guides were given to Basic Technology teachers in six different schools with at least five years experience to critically go through them with respect to the adequacy, structure, language and relevance. Also, the lesson guides were given

to Technical Education experts in the Department of Technical Education, Tai Solarin University of Education, Ijebu-Ode and the researcher's supervisor to comment and make suggestions on the adequacy of the lesson guide. Their observations were duly considered before the final drafts were prepared.

3.7 Trial Testing

The researcher carried out trial testing of the instruments in two public schools with the same features as the experimental and control groups in Ijebu- East Local Government Area (LGA). The trial testing lasted three weeks. Administration of the pre-test for teachers and students in the two schools lasted two days. One week was used for exposing four teachers to treatment and one week was used to expose two intact classes of students in the experimental and control group respectively to treatment and the post-test lasted three days for the teachers and students. Some of the challenges encountered during the trial testing included, irregular supply of electricity, provision of the television and video player, teachers expecting incentives from the researcher and challenges of gathering teachers together in one place at the same time for treatment and training. All these were taken care of during the main study.

3.8 Research Procedure

A letter of introduction obtained from the Department of Teacher Education, University of Ibadan served as a means of introducing the researcher to Ogun State Teaching Service Commission and schools. Schools were approached to ensure that students and their teachers were ready to take part in the study. This was important because the study disrupted the normal school setting to a certain degree.

On visiting the schools, the researcher presented a brief overview of the study with emphasis on the duration and benefits.

Twelve schools were used in the first phase of the study while six schools were used in the second phase of the study. A total of 12 weeks was used for each phase of the study.

3.8.1 Phase 1: Teachers

1. **Week 1**: Pre-test for teachers
2. **Week 2-8**: Treatment (exposing Basic Technology teacher to ICT-based Instructional approach)
3. **Week 9-11:** Training of teachers for production of ICT-based instructional resources
4. **Week 12**: Post-test (administration of the instrument immediately after the main treatment)

3.8.2 Phase 2: Students

1. **Week 1-2 :** Pre-test for students
2. **Week 3-9**: Treatment, teaching the students using trained teachers, ICT-based instructional approach and the instructional guides and lesson plan.
3. **Week 10-12**: Post-test, administration of all the instruments immediately after the main treatment.

3.8.3 Phase 1: Teachers

3.8.4 Administration of pre-test

All the teachers for the study were pre-tested using the evaluative instrument in the following order:

(a) Teachers' Attitude towards Integration Scale (ITAICTS)

(b) In-service Teachers' Computer Attitude Scale (ITCAS).

The administration of pre-test lasted one week

3.8.5 Treatment stage for Teachers (Experimental Group)

The treatment procedure followed the steps identified by Ng, MiaO and Lee (2008) using the training manual developed by the researcher.

Step I: Emerging

Teachers were exposed to basic uses of ICT tools

Step II: Applying

Teachers were exposed to specific uses of ICT tools in the classroom.

Step III: Infusing

Teachers were exposed to integration of ICT in basic technology classroom.

Step IV: Transforming

Teachers were asked to choose a topic and write a lesson plan and teach the lesson using ICT-based instructional approach.

3.8.6 Non- treatment stage for Teachers (Control Group)

In this stage, teachers in the control group were exposed to conventional instructional approach.

This stage involved the following activities:

1. Teacher selected a topic in basic technology curriculum
2. The prepared lesson plan by the teacher reflected:
    - Instructional objectives
    - Relevant instructional resources
3. Provision of researcher-made wall charts
4. The teacher attended classroom during basic technology period to watch classroom presentation using wall charts following the instructional guide and lesson plan.

3.8.7 Post-test

At the completion of treatment period, post-test was administered to the two groups (experimental and control) using Teachers' Attitude towards ICT Integration Scale (ITAICTS)

3.9 Phase 2: Students

3.9.1 Administration of Pre-test

All the students for the study were pre-tested using the evaluative instrument in the following order:

a. Students' Academic Achievement Test in Basic Technology (SAATBT).
b. Students' Attitude to Basic Technology Inventory (SATBTI)
c. Students' Computer Attitude Scale (SCAS)

The administration of pre-test lasted for two weeks.

3.9.2 Treatment stage

3.9.2.1 Experimental Group

This group was taught using the ICT-based instructional approach.

In this stage, the following activities were carried out by the trained teachers and the research assistants:

1. Necessary ICT-tools (DVD player, Television monitor and Recorded CDs) were set up in the classroom before the lesson starts with assistance of the research assistants
2. The lesson started with a review of relevant prior knowledge to relate it to the new topic following the lesson plan.
3. The main concepts for the study were taught to the students at this level using conventional method following the instructional guide and lesson plan.
4. Classroom presentation of instructional resources using ICT-based instructional approach with assistance of the research assistants at the end of classroom discussion.

3.9.2.2 Control Group

This group was taught using conventional method.

In this stage, the following steps were carried out by the teachers in the control group.

1. The lesson stated with a review of relevant prior knowledge to relate it to the new topic following the lesson plan.
2. The main concepts for the study were taught to the students at this level using conventional method following the instructional guide and lesson plan.
3. Classroom presentation of instructional resources using wall charts at the end of classroom discussion.

Each of the groups had a lesson each week for six weeks, totaling six lessons to teach all the concepts.

3.9.3 Post-Test

At the completion of treatment period, post-test was administered to the groups (experimental and control) using the following instruments. These are:

a. Students' Academic Achievement Test in Basic Technology(SAATBT)
b. Students' Attitude to Basic Technology Inventory(SATBTI)

3.10 Data Analysis

The data collected were analysed using Analysis of Covariance (ANCOVA) with pre-test scores as covariates. Multiple Classification Analysis (MCA) was used to determine the magnitude of the achievement of pupils in various groups.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter presents the findings of the study according to the sequence in which the hypotheses were tested at $p < .05$.

4.1 Testing the Hypotheses (First study phase)

Hypothesis 1: There is no significant main effect of treatment on teachers' attitude to integration of ICT

Table 4.1: ANCOVA of Post-test Result of Basic Technology Teachers' Attitude to Classroom Integration of ICT by Treatment, Teachers' Computer Attitude and Gender

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.p	Partial Eta Square
Corrected Model	1479.629[a]	8	184.954	6.786	000	.731
Intercept	29.300	1	29.300	1.075	.312	.051
Trsgrp	.409	1	.409	.015	.904	.001
Trsatpre	413.579	1	413.579	15.174	.001	.431
Compatt	9.846	1	9.846	.361	.555	.018
Gender	17.165	1	17.165	.630	.437	.031
Trsgrp*Compatt	.005	1	.005	.000	.989	.000
Trsgrp* Gender	.713	1	.713	.026	.873	.001
Trsgrp*Compatt* Gender	13.142	2	6.571	.241	.788	.024
Error	545.129	20	27.256			
Total	62838.000	29				
Corrected Total	2024.759	28				

a. R Squared = .731 (Adjusted R Squared = .623)
Significant at $p < .05$

Table 4.1 reveals treatment has no significant effect of treatment on teachers' attitude towards classroom integration of ICT ($F_{(1, 29)}$ = 0.015; p > .05) Hypothesis 1 is therefore not rejected.

This means that the post-test attitude mean scores of teachers in the experimental and control groups are not significantly different.

Table 4.2 is presented to highlight the magnitude of the mean scores.

Table 4.2: Estimated Marginal Means for Teachers' Attitude by Treatment Groups

Teachers' Group	Mean	Std. Deviation	N
Experimental Group	50.3125	6.26864	16
Control Group	40.2308	7.67196	13
Total	45.7931	8.50369	29

From Table 4.2, teachers in the experimental group exposed to ICT-based instructional approach obtained an estimated marginal mean attitude score of 50.31. This is higher than that of the control group with 40.23.

Hypothesis 2: There is no significant main effect of teachers' computer attitude on their attitude to classroom integration of ICT.

Table 4.1 shows that there is no significant main effect of teachers' computer attitude on their attitude to classroom integration of ICT ($F_{(1, 20)}$ = 0.361; p > .05). Hypothesis 2 is therefore accepted.

Hypothesis 3: There is no significant main effect of teachers' gender on their attitude to classroom integration of ICT.

Table 4.1 shows that teachers' gender has no significant main effect on their attitude to classroom integration of ICT ($F_{(1, 20)}$ = 0.630; p >.05). Hypothesis 4 is therefore accepted.

Hypothesis 4: There is no significant interaction effect of treatment and teachers' computer attitude on their attitude to classroom integration of ICT.

Table 4.1 shows that treatment and teachers' computer attitude have no significant effect on their attitude to classroom integration of ICT ($F_{(1, 20)}$ = .005; p > .05), Hypothesis 4 is therefore accepted.

Hypothesis 5: There is no significant interaction effect of treatment and teachers' gender on their attitude to classroom integration of ICT.

Table 4.1 shows that treatment and teachers' gender have no significant effect on their attitude to classroom integration of ICT ($F_{(1, 20)} = 0.713$; $p > .05$), Hypothesis 5 is therefore accepted.

Hypothesis 6: There is no significant interaction effect of teachers' computer attitude and gender on their attitude to classroom integration of ICT.

Table 4.1 shows that teachers' computer attitude and gender have no significant effect on their attitude to classroom integration of ICT ($F_{(1, 20)} = .026$; $p > .05$). Therefore, hypothesis 6 is accepted.

Hypothesis 7: There is no significant interaction effect of treatment, teachers' computer attitude and gender on their attitude to classroom integration of ICT.

Table 4.1 shows that treatment, teachers' computer attitude and gender have no significant effect on their attitude towards classroom integration of ICT ($F_{(1, 20)} = .241$; $p > .05$). Therefore, hypothesis 7 is accepted.

4.2. Testing the Hypotheses (Second study phase)

Hypothesis 1a: There is no significant main effect of treatment on students' achievement in Basic Technology.

Table 4.3: ANCOVA of Post-test Achievement in Basic Technology by Treatment, Computer Attitude and Gender

Source	Type III Sum of Square	Df	Mean Square	F	Sig.
Corrected Model	13387.422	8	1673.428	5.223	.000
Intercept	42005.717	1	42005.717	131.108	.000
Pretest	1000.887	1	1000.887	3.124	.079
Treatment	5855.961	1	5855.961	18.278	.000*
Comp. Attitude	39.780	1	39.780	.124	.725
Gender	1033.919	1	1033.919	3.227	.074
Treatment x Comp. Attitude	80.412	1	80.412	-.251	.617
Treatment x Gender	66.977	1	66.977	.209	.648
Comp. Attitude x Gender	529.562	1	529.562	1.653	.200
Treatment x Comp. Attitude x Gender	382.367	1	382.367	1.193	.276
Error	62796.500	196	320.390		
Total	65453.000	205			
Corrected Total	76183.922	204			

a. R Squared = .176 (Adjusted R Squared = .142)

*Significant at p < .05

Table 4.3 shows that there is significant effect of treatment (ICT-based instructional approach) on students' achievement in basic technology ($F_{(1,205)}$ = 18.28; p<.05). Hence, hypothesis 1a is rejected. This means that the post-test achievement means scores of students in the experimental and control groups are significantly different. Table 4.4 is presented to highlight the magnitude of the mean scores.

Table 4.4: Estimated Marginal Means for Achievement of Treatment Group

Treatment	N	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
ICT-BASED INSTR.	118	58.73	1.855	55.070	62.386
CONVENTIONAL INSTR.	87	46.08	2.089	41.956	50.196

From Table 4.4, students in the experimental group, ICT- based instructional approach scored an estimated marginal mean achievement of 58.73. This is higher than that of the control group with 46.08. This shows that the ICT-based instructional approach was more effective than the conventional approach.

Hypothesis 1b: There is no significant main effect of treatment on Students' attitude to Basic Technology.

Table 4.5: ANCOVA of Post-test Attitude to Basic Technology by Treatment, Computer Attitude and Gender

Source	Type III Sum of Square	Df	Mean Square	F	Sig.p
Corrected Model	762.120	8	95.265	1.534	.148
Intercept	11267.719	1	11267.719	181.426	.000
Pre attitude	1.256	1	1.256	.020	.887
Treatment	254.640	1	254.640	4.100	.044*
Comp. Attitude	35.757	1	35.757	.576	.449
Gender	157.413	1	157.413	2.535	.113
Treatment x Comp. Attitude	63.378	1	63.378	1.020	.314
Treatment x Gender	1.855	1	1.855	.030	.863
Comp. Attitude x Gender	229.791	1	229.791	3.700	.056
Treatment x Comp. Attitude x Gender	42.629	196	42.629	.686	.408
Error	12172.875	196	62.107		
Total	214994.000	205			
Corrected Total	12934.995	204			

a. R Squared = .059 (Adjusted R Squared = .021)

*Significant at p < .05

Table 4.5 reveals that treatment has significant effect on students' attitude to basic technology ($F_{(1,205)}$ = 4.100; p<.05). The hypothesis 1b is therefore, rejected.

Table 4.6 is presented to determine the magnitude of the respective groups' mean attitude scores.

Table 4.6: Estimated Marginal Means for Attitude to Basic Technology by Treatment Group

Treatment	N	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
ICT-BASED INSTR. APP	118	32.46	.782	30.921	34.005
CONVENTIONAL INSTR. APP.	87	30.04	.878	28.306	31.767

Table 4.6 shows that the students exposed to the ICT-based instructional approach obtained higher estimated marginal mean attitude score of 32.46 which is higher than the 30.04 obtained by the control group. For attitude to basic technology therefore, the ICT-based instructional approach proved to be more effective than the conventional instructional approach.

Hypothesis 2a: There is no significant main effect of students' computer attitude on their Achievement in Basic Technology.

From Table 4.3, students' computer attitude has no significant effect on their achievement in Basic Technology ($F_{(1,205)} = .124$; $p>.05$). Hypothesis 2a is therefore, not rejected.

Table 4.7: Estimate Marginal Means for Achievement by Computer Attitude

Computer Attitude	N	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
NEGATIVE	101	52.86	1.817	49.279	56.446
POSITIVE	104	51.94	1.883	48.227	55.655

Table 4.7 shows that students with negative computer attitude had higher estimated marginal mean score ($\bar{x}$ = 52.86) than their counterparts with positive computer attitude ($\bar{x}$ = 51.94).

Hypothesis 2b: There is no significant main effect of students' computer attitude on their Attitude to Basic Technology

Table 4.5 shows ($F_{(1,205)}$ = .576; p<.05). Hence, hypothesis 2b is accepted.

Table 4.8: Estimated Marginal Means for Attitude to Basic Technology by Computer Attitude

COMPUTER ATTITUDE	N	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
NEGATIVE	101	31.69	.805	30.104	33.280
POSITIVE	104	30.81	.834	29.162	32.452

Table 4.8 reveals that students with negative computer attitude had higher attitude mean scores to basic technology ($\bar{x}$ = 31.69) than their peers with positive computer attitude ($\bar{x}$ = 30.81).

Hypothesis 3a: There is no significant main effect of students' gender on their achievement in Basic Technology.

Table 4.3 shows ($F_{(1,205)}$ = 3.227; p>.05).Hypothesis 3a is accepted.

Table 4.9: Estimated Marginal Means for Achievement in Basic Technology by Gender

GENDER	N	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
MALE	86	54.77	1.969	50.886	58.651
FEMALE	119	50.04	1.738	46.607	53.463

From Table 4.9, the male students had higher estimated marginal mean achievement score in Basic technology ($\bar{x}$ = 54.77) than their female counterparts ($\bar{x}$ = 50.04).

Hypothesis 3b: There is no significant main effect of students' gender on their attitude to Basic Technology.

Table 4.5 shows that there is no significant effect of students' gender on their attitude to basic technology ($F_{(1,205)}$ = 2.535; p>.05). Hence hypothesis 3b is not rejected.

Table 4.10: Estimated Marginal Means for Attitude to Basic Technology by Gender

GENDER	N	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
MALE	86	32.17	.866	30.461	33.877
FEMALE	119	30.33	.762	28.828	31.833

HO_{4a}: There is no significant interaction effect of treatment and students' computer attitude on their achievement in Basic Technology

Table 4.3 shows ($F_{(1,205)}$ = -251; p>.05). Hence hypothesis 4a is not rejected.

HO_{4b}: There is no significant interaction effect of treatment and students' computer attitude on their attitude to Basic Technology

From Table 4.5 ($F_{(1,205)}$ = 1.020; p>.05). Hypothesis 4b is therefore accepted.

HO_{5a}: There is no significant interaction effect of treatment and students' gender on their achievement in Basic Technology.

From Table 4.3, treatment and gender have no significant interaction effect on students achievement in Basic Technology ($F_{(1,205)}$ = .209; p>.05) on this basis, hypothesis 5a is not rejected.

HO_{5b}: There is no significant interaction effect of treatment and students' gender on their attitude to Basic Technology.

Table 4.5 reveals that there is no significant interaction effect of treatment and gender on students attitude to basic technology ($F_{(1,205)}$ = .030; p>.05). Hypothesis 5b is, therefore accepted.

HO_{6a}: There is no significant interaction effect of students' computer attitude and gender on their achievement in and attitude to Basic Technology

From Table 4.3 ($F_{(1,205)}$ = 1.653; p>.05). Hypothesis 6a is therefore accepted.

HO_{6b}: There is no significant interaction effect of students' computer attitude and gender on their attitude to Basic Technology

Table 4.5 shows that there is no significant interaction effect of computer attitude and gender on students' attitude to basic technology ($F_{(1,205)}$ = 3.700; p>.05). Hypothesis 6b is, therefore accepted.

HO_{7a}: There is no significant interaction effect of treatment, students' computer attitude and gender on their achievement in Basic Technology.

From Table 4.3, the 3-way interaction effect of treatment, computer attitude and gender on students' achievement in basic technology is not significant ($F_{(1,205)}$ = 1.193; p>.05). Hence, hypothesis 7a is not rejected.

HO_{7b}: There is no significant interaction effect of treatment, students' computer attitude and gender on their attitude toward Basic Technology

Table 4.5 shows that the 3-way interaction effect of treatment, computer attitude and gender on attitude to basic technology is not significant ($F_{(1,205)}$ = .686; p>.05). Therefore, hypothesis 7b is not rejected.

4.3 Discussion of Results

Effects of treatment on in-service teachers' attitude to classroom integration of ICT and students' achievement in and attitude to basic technology.

The main focus of this study was to determine whether or not there would be any difference in attitude to classroom integration of ICT of teachers exposed to ICT-based instructional approach and those exposed to conventional instructional approach on one hand and effects of treatment on students' achievement in and attitude to basic technology on the other hand.

4.3.1 ICT-based Instructional Approach and Teachers' Attitude to Classroom Integration of ICT

One of the dependent variables considered in this study was teachers' attitude to classroom integration of ICT.

Hypotheses one (H_{O1}) states that there is no significant main effect of treatment on teachers' attitude to ICT integration. Table 4.1 show that there is no significant main effect of treatment on teachers' attitude to ICT integration but teachers' in the treatment group had higher mean score (50.31) than teachers' in the control group

(40.23).This is in contrast with the findings of Jung (2005), that ICT-based instructional approach influenced teachers' attitude to classroom use of ICT. In his report, the extent of influence of ICT-based instructional approach on teachers' attitude to classroom use of ICT was not reported. Notably, findings in this study indicated that teachers in the experimental group had higher mean score than those in the control group, but the difference was not significant. This shows that ICT-based instructional approach used in this study was not effective enough in improving teachers' attitude to classroom integration.

One of the reasons that might account for this might be traced to what Arinto, (2006) referred to as lack of capacity building. Notably, the star (2008) also states that the bulk of funding for ICT integration projects in schools goes to hardware and very little goes to effective teachers training that can build teachers capacity with poor implementation strategies and lack of systematically plan for ICT adoption among basic technology teachers in the past might account for un-noticeable effect of ICT-based instructional approach on teachers' attitude to integration. This finding can also be linked with outcomes of international initiatives such NEPAD, OLPC and use of 5J approach. In all these initiatives, hardwares were made available and accessible to participants, yet, less than 50% of the participants integrate ICT in their lessons. This shows the need for more attention on systematic capacity building.

4.3.2 Teachers' Computer Attitude and Attitude toward Classroom Integration of ICT

One of the moderator variables considered in this study was teachers' computer attitude.

Hypotheses two ($Ho_{2)}$ states that there is no significant main effect of teachers' computer attitude on their attitude to classroom integration of ICT. Table 4.1 shows that teachers computers' attitude has no significant effect on their attitude to classroom integration of ICT.

This finding contradicts Yuan and Ma (2001) who reported that computer attitude is significant in determining use of ICT in the classroom. This finding also negates the reports of Myers and Halpin (2002) and Van Break et al (2004) that teachers' computer attitude is a major predictor for future use of computer in the classroom. The finding is also not in support of the reports of Kumar and Kumar

(2009) and Sang et al (2009) who report that computer attitude influence teachers' attitude to ICT integration in the classroom. This suggests that there is another variable apart from teachers' computer attitude that can serve as a major predictor to influence teachers' attitude to classroom integration of ICT. One of the factors that might account for this contradictory findings can be traced to the fact that the researcher used teachers whose computer attitude rating was between medium and high. This shows that the participants (basic technology teachers) used in this study had computer attitude rating between negative and positive. However, Van Braak (2001) observes that positive computer attitude is expected to foaster ICT integrations. Thus, a careful conclusion that may still be drawn from this result on teachers' computer attitude mean scores is that if teachers with high computer experience only were selected as participants for this study, the findings may be different.

4.3.3 Teachers Attitude to Classroom Integration of ICT and Gender

Hypotheses three ($Ho_{3)}$ states that there is no significant main effect of teachers' gender on their attitude to classroom integration of ICT. Table 4.1 shows that teachers' gender has no significant effect on their attitude towards classroom integration of ICT. This finding is not in support of Mooris (2000) who reports that gender is one of the factors that influence classroom adoption of ICT. While it supports Birisci and Karakas (2009) that there was no significant difference in attitude of male and female towards integration of ICT. The finding is in support of Yusuf and Balogun (2011) who contends that there is no significant difference between male and female attitude to classroom integration of ICT.

The plausible reasons for this finding might be attributed to the fact that both gender have access to mobile devices such as Mobile phone, I pad, Palm top among others. In addition, the use of e-exam, ATM cards for admission, transaction and administrative purposes had remove the digital divide between male and female teachers in the use of ICT tools.

4.3.4 Effects of Treatment on Students' Achievement and Attitude

The two dependent variables considered in the second phase of this study were students' achievement in and attitude to basic technology.

Hypothesis One (HO_1) states that there is no significant main effect of treatment on students' achievement in and attitude to basic technology.

The findings of the study in Table 4.3 reveals that there is significant effect of treatment on students' achievement in Basic Technology. The magnitude of the mean scores as shown in Table 4.4 reveals that the ICT-based instructional approach was significantly better than conventional instructional approach. The performance of students exposed to ICT-based instructional approach may be attributed to the fact that the approach enhances meaningful learning and mastery understanding as a result of providing real-life experiences to learners in the classroom. This finding corroborates Hadad (2003) that ICT-based instruction changes the way teachers teach and the way students learn. The fact that ICT-based instructional approach is better than conventional approach in improving students' achievement could be attributed to the fact that it makes teaching and learning more interesting to students which prompt rapt attention in the classroom thereby improving retention of learning materials to enhance better achievement.

Another fact that seems evident from this result is that the ICT-based instructional approach has capacity for effective communication of skills required in performance of practical tasks in a situation where there is no basic technology workshop and lack of materials and tools required thereby creating virtual learning environment which provides the required experience for this group of students.

The poor performance of students exposed to conventional instructional approach in the post-test achievement mean score when compared with the other treatment group may be attributed to the fact that most schools do not have basic technology workshop and there were no materials and tools through which the content of an instruction can be made meaningful to the learners. Hence, the students were only exposed to instructional materials (wall charts). This makes the students to be passive listeners with little or no interaction with the learning materials. This finding corroborates Abimbade (1996), Udousoro and Abimbade (1997), Ajelabi (1998), Udousoro (2000) and Onasanya et al (2010) that ICT-based instruction enhanced

students' achievement in school subjects. It also supports Akorede and Adefuye (2011) who submit that ICT-based instructional approach improved students achievement in Basic Technology. However, it contradicts Daramola and Asquo (2006) who report that there is no significant difference between the performance of students exposed to CAI package and those exposed to conventional method of instruction in Introductory Technology.

The second part of the first hypothesis (HO_7) (b) states that there is no significant effect of treatment on students' attitude to basic technology. The finding on this study in Table 4.5 shows that there is a significant main effect of treatment on students' attitude to basic technology. The magnitude of mean scores in Table 4.6 shows that students exposed to ICT-based instructional approach (experimental group) have more positive attitude to basic technology than those exposed to conventional instructional approach. The finding shows that ICT-based instructional approach enhanced positive attitude of students to Basic Technology than those exposed to conventional instructional approach. The finding corroborates Lee (2001) who contends that if CAL materials are developed and implemented in an effective way, students' attitude toward science lessons will increase positively.

The poor attitude of the students exposed to the conventional instructional approach when compared with the students exposed to the ICT-based instructional approach might be related to the fact that the students had low interaction with the learning materials which makes lesson presentation boring and not motivating. This perhaps led to loss of interest in the teaching and learning of the subject which perhaps accounted for the poor attitude to basic technology.

This finding can be explained in line with report of Lowther et al (2008). It was pointed out that an appropriate classroom integration can significantly improve learning outcomes. This is supported by reports of Ibode, 2004; Adedoja and Kosoko-Oyedepo, 2012, Ituen 2009 and Ogunleye, 2009 that ICT-based instructional approach can improve learning outcomes is school subjects.

4.3.5 Effects of Students' Computer Attitude on Students' Achievement and Attitude

One of the moderator variables considered in the second phase of this study is students' computer attitude.

Hypothesis two (HO_2) states that there is no significant main effect of computer attitude on students' achievement in basic technology. The findings on the hypothesis in Tables 4.7 indicate that there is no significant effect of students' computer attitude on their achievement. This shows that computer attitude had no significant effect on students' achievement in basic technology. One of the possible reasons for the contradictory findings might be traced to the fact that the researcher used intact classes of participants (basic technology students) whose computer attitude cannot be controlled.

This shows that the participants had computer attitude rating between negative and positive and there is tendency to have those with negative computer attitude than those in other group, whereas Tsai and Tsai (2003) reports that students with positive computer attitude had better learning outcomes.

4.3.6 Effects of Gender on Students' Achievement and Attitude

Another moderator variable considered in this study is the students' gender, captured by (HO_3).Hypothesis three which states that there is no significant effect of gender on students' achievement in and attitude to basic technology.

Table 4.9 shows that gender had no significant effect on students' achievement in basic technology. Table 4.9 also shows that male students had higher achievement mean scores (54.77) than female students (50.04) although the difference is not significant. This finding supports Onasanya et al (2006) that there is no significant difference in achievement of male and female students in introductory technology when exposed to different modes of CAI. Also, the finding corroborates Fakomogbon et al (2010) who contends that there is no significant difference between achievement of male and female students when taught with use of ICT software. Also, this finding corroborates Abdulahi (1982) and Oludipe (2012 that there is no gender difference in achievement of students exposed to ICT-based instruction in Basic Science.

Also Table 4.10 shows that gender has no significant effect on students' attitude to basic technology. Table 4.10 shows that male students had higher attitude mean scores (32.17) than the female students (30.33) although the difference is not significant. This finding supports Ossi et al (2007) who report that both male and female students are attracted to technology education because they enjoy working with their hands and have flare for creativity.

4.3.7 Effects of Treatment, Computer Attitude and Gender on Students' Achievement and Attitude

There is the need to determine the interaction effect of treatment, computer attitude and gender on students' learning outcomes (achievement and attitude).

Hypothesis Seven (HO_7) states that there are no significant interaction effects of treatment, computer attitude and gender on students' achievement in and attitude to basic technology. Tables 4.3 and 4.5 indicate that there is no significant interaction effect of treatment, computer attitude and gender on students' achievement in and attitude to basic technology. The fact that treatment, computer attitude and gender had no interaction effect on students' achievement and attitude shows the efficacy of ICT-based instructional approach. It also shows that ICT-based instructional approach alone accounted for improvement observed.

CHAPTER FIVE
SUMMARY, IMPLICATIONS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the summary of the findings, implications, recommendations and conclusion.

5.1.1 Summary of Findings (First study phase)

In this study, seven hypotheses were tested at 0.05 level of significance in the first and second phase of the study. The findings of the study are summarised and presented as follows:

1. There is no significant main effect of treatment on teachers' attitude to ICT integration.
2. Teachers' computer attitude did not influence their attitude to ICT integration.
3. Gender has no significant main effect on teachers' attitude to ICT integration.
4. There is no significant interaction effect of treatment and teachers' computer attitude on their attitude to integration of ICT
5. There is no significant interaction effect of treatment and teachers' gender on their attitude to integration of ICT.
6. There is no significant interaction effect of teachers' computer attitude and gender on their attitude to integration of ICT
7. There is no significant interaction effect of treatment, teachers' computer attitude and gender on their attitude to integration of ICT

5.1.2 Summary of Findings (Second study phase)

1. There is significant effect of treatment (ICT-based instructional approach) on students' achievement in basic technology.
2. Treatment has significant effect on students' attitude to basic technology.
3. Students' computer attitude has no significant effect on their achievement in basic technology.
4. Students' computer attitude has no significant effect on their attitude to basic technology.

5. There is no significant effect of students' gender on their achievement in basic technology.
6. There is no significant effect of students' gender on their attitude to basic technology.
7. Treatment and computer attitude have no significant interaction effect on students' achievement in basic technology.
8. There is no significant interaction effect of treatment and computer attitude on students' attitude to basic technology.
9. There is no significant interaction effect of treatment and gender on students' achievement in basic technology. .
10. There is no significant interaction effect of treatment and gender on students' attitude to basic technology.
11. There is no significant interaction effect of computer attitude to and gender on students' achievement in basic technology
12. There is no significant interaction effect of computer attitude to and gender on students' attitude to basic technology.
13. The 3-way interaction effect of treatment, computer attitude and gender on students' achievement in basic technology is not significant.
14. The 3-way interaction effect of treatment, computer attitude and gender on students' attitude to basic technology is not significant

5.2 Implications of the Findings

The findings of this study reveal that mean scores of teachers in the experimental group was not significantly different from those in the control group (Table 4.1).The implication of the findings is that there is need for further investigation by modifying the approach used in this study in terms of criteria for selecting the teachers and duration of the training.

The ICT-based instructional approach in the second phase of this study is effective because it enhanced meaningful learning and mastery understanding as a result of providing real-life experiences to the learners in the classroom in the absence of use of life materials and equipment in the basic technology workshop. Many basic technology teachers have been finding it difficult to expose their students to practical aspects of basic technology content due to lack of materials and equipment and over

population of students in the basic technology classrooms. This is a pointer to the urgent need to integrate ICT-based instructional approach which has the potential to create virtual learning environment to solve the problem of teaching the subject in abstract and improve students' learning outcomes in basic technology. This therefore, calls for alternative approach or intervention to facilitate teachers' positive attitude to integration of ICT in basic technology classroom. There is need to intimate them with innovative approach of teaching the subject and particularly with the use of ICT-based instructional approach in basic technology classrooms.

In summary, the results of this study have shown the need for use of ICT-based instructional approach to improve students' achievement in and attitude to basic technology. There is a need for prompt attention of stakeholders in education to integrate ICT-based instructional approach while discouraging the use of conventional instructional approach.

5.3 Conclusion

Among several attempts made to improve students' achievement in and attitude to school subjects, a shift in the way teachers teach and the way students learn has been emphasised. The need for alternative approach or intervention to facilitate teachers' positive attitude to integration of ICT in basic technology classroom on one hand and to improve students' achievement in and attitude to basic technology through the use of ICT-based instructional approach on the other hand have been found very necessary. It can be concluded from the findings of this study that ICT-based instructional approach facilitates better achievement in and attitude to basic technology than conventional instructional approach.

Teachers' computer attitude was seen not to have determined their classroom integration of ICT and students' learning outcomes. There is need for more awareness of the importance of computer and ICT literacy among teachers and students to improve their computer attitude.

ICT-based instructional resources enhanced students' achievement in and attitude to basic technology because the study shows that it yielded significantly better result than conventional instructional resources.

5.4 Recommendations

Based on the findings of this study, the following recommendations are made. There is need for modified approach or alternative intervention to facilitate teachers' positive attitude to classroom integration of ICT. Sustainable ICT-based resources should be provided and used to promote ICT-based instructional approach in basic technology classrooms to enhance better learning outcomes of students.

The institutions involved in training of teachers such as colleges of education and faculty of education in the universities should review the curriculum of the pre-service teachers to equip them with required skills that can facilitate ICT integration in basic technology classroom.

Workshops and seminars should be organised by the Teaching Service Commission for re-training of in-service basic technology teachers to equip them with necessary ICT knowledge and integration skills that can improve students' achievement in and attitude to basic technology.

Computer education curriculum at JSS level should be modified to have direct impact on students' computer literacy and attitude. This can be done by including instructional contents and practical ways of using ICT tools for instructional purposes in computer education curriculum at JSS level. Curriculum planners and textbook writers should incorporate integration of ICT into classroom implementation of the curriculum as medium of instructional delivery with clearly spelt out guide for teachers.

5.5 Limitations of the Study

It has been noted that certain factors can be seen as a limitation to the generalisation of the results of this study. These limitations included the fact that the study was carried out with small number of teachers in six schools in three Local Government Areas (LGAS) of Ogun State. In addition, the experiment was carried out using six selected maintenance concepts in basic technology at Junior Secondary II (JSS II) in which intact classes were used because the researcher could not randomise the assignment of students to treatment and control group. Therefore, any generalisation drawn from this study should be considered with caution.

Notably, among other moderator variables, only computer attitude and gender were used whereas, it is possible that other intervening variables could limit the extent

of generalisation of the findings of this study. In the first phase of this study, teachers with medium and high computer experience were selected whereas; the result could be different if teachers with only high computer experience and positive perception were used. Further, the scope of this study is limited by time as a period of thirteen weeks used in conducting this study may as well influence its generalisation.

Regardless of the discussed limitations, it is hoped that the findings of this study would serve as foundation for further studies in the area of ICT-based instructional approach and its proper utilisation for effective teaching and learning of basic technology in JSS.

5.6 Suggestions for further studies

In view of the limitations of this study, the following suggestions are made for further studies.

The study should be replicated and cover more concepts, participants, schools, LGAS and states of the federation. This will make findings of such study to be more general sable. In addition, the study could be replicated using only teachers with high computer experience.

The study could be replicated covering more period of time to allow the teachers and students to get more acquainted with ICT-based instructional approach.

Lastly, more variables such as teacher educational qualification, teaching experience, academic ability and areas of specialisation could also be brought into similar study.

5.7 Contribution to Knowledge

- The findings of this study have shown that ICT-based instructional approach did not significantly improve teachers' attitude to classroom integration of ICT in basic technology classroom.
- Further, teachers' computer attitude and gender did not influence their attitude to classroom integration of ICT.
- This result has provided basis for curriculum innovation in training and re-training of in-service teachers in providing and motivating them to classroom integration of ICT and to guide institutions intending to integrate ICT in the classroom to make a wise decision.

- The ICT-based instructional resources in the second phase of this study was effective in improving students' learning outcomes in basic technology through provision of video-based learning experiences in the basic technology classrooms.
- Classroom use of this approach will improve the poor students' achievement in and attitude to basic technology in JSS.

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APPENDIX IA

INSTRUCTIONAL GUIDE ON INSTRUCTIONAL APPROACHES FOR BASIC TECHNOLOGY TEACHERS

Steps	ICT-Based Instructional Approach	Conventional Lecture Method
Orientation (Introduction)	(i) Research assistants take attendance of teachers. (ii) Specify the objectives of the programme (iii) List the topics to be covered, thus: - Simple Maintenance - Maintenance of Domestic Appliances ▪ Dusting ▪ Cleaning ▪ Washing ▪ Replacement of damaged parts ▪ Wood conversion	Same as in ICT-based instructional approach.
Presenting Stimulus (Presentation)	▪ Video presentation of preventive, predictive and corrective maintenance. ▪ Video presentation of maintenance of Domestic appliances: - Dusting - Cleaning - Washing - Replacement of damaged parts ion of wood conversion.	▪ Wall chart presentation of preventive, predictive and corrective maintenance. ▪ Wall chart presentation of maintenance of Domestic appliances. - Dusting - Cleaning - Washing - Replacement of damaged parts ▪ Wall chart presentation of wood conversion.
Evaluation	Make brief discussion on the presentations.	
Training	▪ Exposing the selected Basic Technology teachers in the experimental group with positive computer attitude to ICT-Integration training. ▪ Production of ICT-based instructional materials.	
Classroom practice	The selected teachers used ICT-based instructional materials to teach simple maintenance and maintenance of domestic appliances in JSSII.	The selected teachers in the control group will use wall charts to teach simple maintenance of domestic appliances in JSSII

APPENDIX IB

INSTRUCTIONAL GUIDE ON SIMPLE MAINTENANCE

Steps	**ICT-Based Instructional Approach**	**Modified Conventional Lecture Method**
Orientation (Introduction)	(i) Teacher takes attendance (ii) Gives the topic (simple maintenance) (iii) Specifies the objectives of the lesson (iv) Link new topic with previous knowledge	Same as in ICT-based instructional approach.
Presenting Stimulus (Presentation)	(i) Define the topic (ii) Explain the topic (iii) Video presentation of the practical aspects of the topics	(i) Define the topic (ii) Explain the topic (iii) Wall chart presentation of the practical aspects of the topics.
Evaluation	Give questions on the topics	Give questions on the topics

APPENDIX IIA

TRAINING MANUAL

Face to Face Mode of ICT-based Training for Teachers

(A)

I. Topic selection

II. Identification of instructional objectives and learning experiences

(B) Capturing of Learning Experiences

1 - click menu

2 - select and click media

3 - select and click video recorder

4 - click record to capture the information

- click pause (if you wish to pause recording)
- click continue (if you wish to continue)
- click stop (if you wish to stop)
- recorded information is saved in video clips

(C) Transfer of Data from phone to memory card

1 - click menu

2 - select and click Gallery

3 - select video clip to be saved in the memory card

4 - click option

5 - select and click copy

6 - select and click memory card (project memo)

(D) Transfer of data from Memory card to Laptop via Card Reader

1 - Insert the memory card in the card reader

2 - insert the card reader in the laptop

3 - click computer

- when it has shown on the desktop, right click on it
- Select Jimmy

4 - Select the required file e.g. video 0015

- Right click the file
- Select send to
- Select and Right click Documents

5 Copy the required video clips from Documents to NEW PROJECT FOLDER

(E) Data Conversion

1. Double click on Total Video Converter

   -Dialogue box displayed

   -Click New Task

   -Select Import File

   -Files displayed

2. Select and click New project

   -Select the project/Video/File to be converted e.g. video 011 or project 2

   -Click open

   -Converter displayed

3. Select MPEC

   -Select VCD MPEC or DVD MPEC(as the situation required)

   -Click underneath of VCD MPEC

   -Select PAL VCD (or PAL DVD)

4. Go to output file- click (where work will be converted to)

   -Dialogue box ` displayed

5. Enter file name e.g. video 4
6. Click save
7. Click convert now

   -Wait for the conversion

(F) Burning CD

1. Click VCD
2. Click Next
3. Click Next
4. Select speed (maximum 24X)
5. Click Next
6. Click start to burn
7. Click OK

APPENDIX IIB

TRAINING MANUAL

Video Presentation Mode of ICT-based Training for Teachers

Video Presentation mode of ICT pedagogy

Video presentation of brief summary of steps involved in production of ICT-based instructional materials.

(i) Topic selection

(ii) Identification of instructional objectives and relevant learning experiences

(iii) Capturing of learning experiences

(iv) Transfer of data from phone memory to memory card

(v) Transfer of data from memory card to laptop via card reader

(vi) Data conversion using total video converter

(vii) Burning of CD using burner

Video presentation of classroom use of ICT-based instructional materials

(i) introduction of the topic

(ii) Presentation of instructional content

(iii)presentation of relevant ICT-based instructional materials

(iv) conclusion

(v) Evaluation

APPENDIX II C

CONVENTIONAL INSTRUCTIONAL APPROACH (CIA)

1. Identification of learning experiences.
2. Locating the learning experiences
3. Capturing the learning experiences on wall charts with experts' assistance.

APPENDIX IIIA

ICT-BASED INSTRUCTIONAL APPROACH

INSTRUCTIONAL GUIDE FOR TEACHERS

LESSON 1

Topic: Simple Maintenance

Time: 40mins.

Class: JSS II

Instructional Resources: Video CD on preventive, predictive and corrective maintenance

Behavioural Objectives: At the end of the lesson students should be able to:

(a) define simple maintenance

(b) list the three types of maintenance

(c) explain briefly each of the three types of maintenance.

Entry Behaviour: Students are aware of taking good care of some household goods:

Presenting stimulus:

The teacher introduces the topic of the lesson to the class. The teacher defines maintenance. The teacher lists the three types of maintenance. The teacher defines preventive maintenance and explains briefly. The teacher defines predictive maintenance and explains briefly. The teacher defines corrective maintenance and explains briefly.

Media Presentation: The teacher presents:

(a) Video presentation of examples of preventive maintenance

(b) Video presentation of examples of predictive maintenance

(c) Video presentation of examples of corrective maintenance

Evaluation: The teacher asks the following questions:

(a) Define maintenance

(b) List the three types of maintenance and give one example in each case.

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APPENDIX IIIB

ICT-BASED INSTRUCTIONAL APPROACH

INSTRUCTIONAL GUIDE FOR TEACHERS

LESSON 1I

Topic: Simple Maintenance of Domestic Appliances (DUSTING)

Time: 40Mins.

Class : JSS II

Instructional Resources: Video CD on dusting of Radio, Television monitor, DVD player and Table fan

Behavioural Objectives: At the end of the lesson students should be able to:

(a) define simple maintenance

(b) list the four maintenance methods

(c) explain dusting as one of the maintenance methods

(d) mention one dusting material

(e) state at least four appliances that require dusting

(f) describe dusting of any of the four appliances mentioned above

Entry Behaviour: Students have been taught simple maintenance

Presenting stimulus: The teacher introduces the topic of the lesson to the class. The teacher explains maintenance methods. The teacher lists examples of domestic appliances. The teacher lists five maintenance methods. The teacher explains dusting of domestic appliances and mention dusting materials. The teacher lists four examples of domestic appliances that require dusting.

Media Presentation: The teacher presents:

a) Video presentation of examples of domestic appliances that require dusting

b) Video presentation of dusting materials

c) Video presentation of dusting radio

d) Video presentation of dusting television

Evaluation: The teacher asks the following questions:

a) List five maintenance methods

b) What is dusting?

c) List two dusting materials

d) List three domestic appliances that require dusting

APPENDIX IIIC

ICT-BASED INSTRUCTIONAL APPROACH

INSTRUCTIONAL GUIDE FOR TEACHERS

LESSON III

Topic: Simple Maintenance of Domestic Appliances (CLEANING)

Time: 40Mins.

Class :JSS II

Instructional Resources: Video CD on Cleaning of Radio, Television monitor, DVD player and Table fan

Behavioural Objectives: At the end of the lesson students should be able to:

(a) explain cleaning as one of the maintenance methods

(b) list one cleaning material

(c) mention at least four appliances that require cleaning

(d) describe dusting of any of the four appliances mentioned above

Entry Behaviour: Students have been taught dusting of domestic appliances

Presenting Stimulus: To the class, the teacher introduces the topic of the lesson, the teacher refuses students' memory on the four maintenance methods. The teacher explains cleaning of domestic appliances and list two cleaning materials. The teacher lists four examples of domestic appliances that require cleaning.

Media Presentation:

(a) Video presentation of domestic appliances that require cleaning

(b) Video presentation of cleaning materials

(c) Video presentation of cleaning Radio

(d) Video presentation of cleaning Television

Evaluation: The teacher asks the following questions:

(a) What is Cleaning

(b) List two cleaning materials

(c) List three domestic appliances that require cleaning.

APPENDIX IIID

ICT-BASED INSTRUCTIONAL APPROACH

INSTRUCTIONAL GUIDE FOR TEACHERS

LESSON 1V

Topic: Simple Maintenance of Domestic Appliances (WASHING)

Time: 40Mins.

Class : JSS II

Instructional Resources: Video CD on washing of kitchenware (plates, cups and cutlery)

Behavioural Objectives: At the end of the lesson students should be able to:

(a) explain washing as one of the maintenance methods

(b) list five washing materials

(c) mention at least three kitchenware that require washing

(d) describe washing of any of the three appliances mentioned above

Entry Behaviour: Students have been taught cleaning of domestic appliances.

Presenting Stimulus: The teacher refreshes students' memory on five maintenance methods. The teacher introduces the topic of the lesson to the class. The teacher explains washing of domestic appliances. The teacher lists examples of kitchen wares. The teacher lists washing materials.

Media Presentation:

(a) Video Presentation of kitchen ware

(b) Video Presentation of washing materials

(c) Video Presentation of washing plates

(d) Video Presentation of washing cups

(e) Video Presentation of washing pots.

Evaluation:

(a) List four examples of kitchen wares

(b) List four examples of domestic appliances that require washing.

(c) List four materials require for washing kitchen wares.

APPENDIX IIIE

ICT-BASED INSTRUCTIONAL APPROACH

INSTRUCTIONAL GUIDE FOR TEACHERS

LESSON V

Topic: Simple Maintenance of Domestic Appliances (OILING)

Time: 40Mins.

Class: JSS II

Instructional Resources: Video CD on Oiling a Clipper

Behavioural Objectives: At the end of the lesson students should be able to:

(a) mention one domestic appliance that require oiling

(b) list one oiling materials

(c) list two oiling equipment

Entry Behaviour: Students have been taught washing of kitchen.

Presenting Stimulus: The teacher refreshes students' memory on five maintenance methods. The teacher introduces the topic of the lesson to the class. The teacher list domestic appliances that require oiling. The teacher mention oiling materials and equipment.

Medial Presentation:

(a) Video presentation of domestic appliances that require oiling

(b) Video presentation of oiling materials and equipment

(c) Video presentation of oiling clipper.

Evaluation: The teacher asks the following questions:

(a) What is oiling?

(b) List one domestic appliance that require oiling.

(c) List one oiling material

(d) List two oiling equipment.

APPENDIX IIIF

ICT-BASED INSTRUCTIONAL APPROACH

INSTRUCTIONAL GUIDE FOR TEACHERS

LESSON VI

Topic: Simple Maintenance of Domestic Appliances (Replacement of Damaged parts)

Time: 40Mins.

Class ;JSS II

Instructional Resources: Video presentation of replacement of damaged part of a stabilizer

Behavioural Objectives: At the end of the lesson students should be able to:

(a) explain replacement of damaged part as one of the maintenance methods

(b) list some domestic appliances that require replacement of parts when damaged

(c) describe replacement damaged part of a stabilizer

Entry Behaviour: Students have been taught oiling of domestic appliances.

Presentation Stimulus: The teacher refreshes students' memory on five maintenance methods. The teacher introduces the topic of the lesson to the class. The teacher explains replacement of damaged parts in domestic appliances. The teacher mentions domestic appliances that require replacement of damaged parts. The teacher mentions specific example and the technician that can effect the replacement.

Media Presentation:

(a) Video presentation of faulty domestic appliances that require replacement of damaged parts

(b) Video presentation of replacement of damaged parts.

Evaluation: The teacher asks the following questions:

(a) List two domestic appliances that may require replacement of damaged parts.

(b) Mention the technician requires effecting the replacement.

APPENDIX IIIG

CONVENTIONAL INSTRUCTIONAL APPROACH

INSTRUCTIONAL GUIDE FOR TEACHERS

LESSON 1

Topic: Practical demonstration of preventive, predictive and corrective Maintenance

Time: 40mins.

Class: JSS II

Instructional Resources: Wall charts on preventive, predictive and corrective maintenance

Behavioural Objectives: At the end of the lesson students should be able to:

(d) define simple maintenance

(e) list the three types of maintenance

(f) explain briefly each of the three types of maintenance.

Entry Behaviour: Students are aware of taking good care of some household goods:

Presenting stimulus:

The teacher introduces the topic of the lesson to the class. The teacher defines maintenance. The teacher lists the three types of maintenance. The teacher defines preventive maintenance and explains briefly. The teacher defines predictive maintenance and explains briefly. The teacher defines corrective maintenance and explains briefly.

Media Presentation: The teacher presents:

(d) Wall charts presentation of examples of preventive maintenance

(e) Wall charts presentation of examples of predictive maintenance

(f) Wall charts presentation of examples of corrective maintenance

Evaluation: The teacher asks the following questions:

(c) Define maintenance

(d) List the three types of maintenance and give one example in each case.

.

APPENDIX IIIH

CONVENTIONAL INSTRUCTIONAL APPROACH

INSTRUCTIONAL GUIDE FOR TEACHERS

LESSON 1I

Topic: Simple Maintenance of Domestic Appliances (DUSTING)

Time: 40Mins.

Class : JSS II

Instructional Materials: Wall charts on dusting of Radio, Television monitor, DVD player and Table fan

Behavioural Objectives: At the end of the lesson students should be able to:

(a) define simple maintenance

(b) list the four maintenance methods

(c) explain dusting as one of the maintenance methods

(d) mention one dusting material

(e) state at least four appliances that require dusting

(f) describe dusting of any of the four appliances mentioned above

Entry Behaviour: Students have been taught simple maintenance

Presenting stimulus: The teacher introduces the topic of the lesson to the class. The teacher explains maintenance methods. The teacher lists examples of domestic appliances. The teacher lists five maintenance methods. The teacher explains dusting of domestic appliances and mention dusting materials. The teacher lists four examples of domestic appliances that require dusting.

Media Presentation: The teacher presents:

a) Wall charts presentation of examples of domestic appliances that require dusting

b) Wall charts presentation of dusting materials

c) Wall charts presentation of dusting radio

d) Wall charts presentation of dusting television

Evaluation: The teacher asks the following questions:

a) List five maintenance methods

b) What is dusting?

c) List two dusting materials

d) List three domestic appliances that require dusting

APPENDIX III I

CONVENTIONAL INSTRUCTIONAL APPROACH

INSTRUCTIONAL GUIDE FOR TEACHERS

LESSON III

Topic: Simple Maintenance of Domestic Appliances (CLEANING)

Time: 40Mins.

Class : JSS II

Instructional Resources: Wall charts on Cleaning of Radio, Television monitor, DVD player and Table fan

Behavioural Objectives: At the end of the lesson students should be able to:

(a) explain cleaning as one of the maintenance methods

(b) list one cleaning material

(c) mention at least four appliances that require cleaning

(d) describe dusting of any of the four appliances mentioned above

Entry Behaviour: Students have been taught dusting of domestic appliances

Presenting Stimulus: To the class, The teacher introduces the topic of the lesson, the teacher refuses students' memory on the four maintenance methods. The teacher explains cleaning of domestic appliances and list two cleaning materials. The teacher lists four examples of domestic appliances that require cleaning.

Media Presentation:

a) Wall charts presentation of domestic appliances that require cleaning

b) Wall charts presentation of cleaning materials

c) Wall charts presentation of cleaning Radio

d) Wall charts presentation of cleaning Television

Evaluation: The teacher asks the following questions:

a) What is Cleaning

b) List two cleaning materials

c) List three domestic appliances that require cleaning.

APPENDIX IIIJ

CONVENTIONAL INSTRUCTIONAL APPROACH

INSTRUCTIONAL GUIDE FOR TEACHERS

LESSON 1V

Topic: Simple Maintenance of Domestic Appliances (WASHING)

Time: 40Mins.

Class ; JSS II

Instructional Resources: Wall charts on kitchenware (plates, cups and cutlery)

Behavioural Objectives: At the end of the lesson students should be able to:

(a) explain washing as one of the maintenance methods

(b) list five washing materials

(c) mention at least three kitchenware that require washing

(d) describe washing of any of the three appliances mentioned above

Entry Behaviour: Students have been taught cleaning of domestic appliances.

Presenting Stimulus: The teacher refreshes students' memory on five maintenance methods. The teacher introduces the topic of the lesson to the class. The teacher explains washing of domestic appliances. The teacher lists examples of kitchen wares. The teacher lists washing materials.

Media Presentation:

a) Wall charts Presentation of kitchen ware

b) Wall charts Presentation of washing materials

c) Wall charts Presentation of washing plates

d) Wall charts Presentation of washing cups

e) Wall charts Presentation of washing pots.

Evaluation:

a) List four examples of kitchen wares

b) List four examples of domestic appliances that require washing.

c) List four materials require for washing kitchen wares.

APPENDIX IIIK

CONVENTIONAL INSTRUCTIONAL APPROACH

INSTRUCTIONAL GUIDE FOR TEACHERS

LESSON V

Topic: Simple Maintenance of Domestic Appliances (OILING)

Time: 40Mins.

Class : JSS II

Instructional Resources: Wall charts on Oiling a Clipper

Behavioural Objectives: At the end of the lesson students should be able to:

(a) mention one domestic appliance that require oiling

(b) list one oiling materials

(c) list two oiling equipment

Entry Behaviour: Students have been taught washing of kitchen.

Presenting Stimulus: The teacher refreshes students' memory on five maintenance methods. The teacher introduces the topic of the lesson to the class. The teacher list domestic appliances that require oiling. The teacher mention oiling materials and equipment.

Medial Presentation:

a) Wall charts presentation of domestic appliances that require oiling

b) Wall charts presentation of oiling materials and equipment

c) Wall charts presentation of oiling clipper.

Evaluation: The teacher asks the following questions:

a) What is oiling?

b) List one domestic appliance that require oiling.

c) List one oiling material

d) List two oiling equipment.

APPENDIX IIIL

CONVENTIONAL INSTRUCTIONAL APPROACH

INSTRUCTIONAL GUIDE FOR TEACHERS

LESSON VI

Topic: Simple Maintenance of Domestic Appliances (Replacement of Damaged parts)

Time: 40Mins.

Class : JSS II

Instructional Resources: Wall charts on replacement of damaged part of a stabilizer

Behavioural Objectives: At the end of the lesson students should be able to:

(a) explain replacement of damaged part as one of the maintenance methods

(b) list some domestic appliances that require replacement of parts when damaged

(c) describe replacement damaged part of a stabilizer

Entry Behaviour: Students have been taught oiling of domestic appliances.

Presentation Stimulus: The teacher refreshes students' memory on five maintenance methods. The teacher introduces the topic of the lesson to the class. The teacher explains replacement of damaged parts in domestic appliances. The teacher mentions domestic appliances that require replacement of damaged parts. The teacher mentions specific example and the technician that can effect the replacement.

Media Presentation:

a) Wall charts presentation of faulty domestic appliances that require replacement of damaged parts

b) Wall charts presentation of replacement of damaged parts.

Evaluation: The teacher asks the following questions:

a) List two domestic appliances that may require replacement of damaged parts.

b) Mention the technician requires effecting the replacement.

APPENDIX IV

IN-SERVICE TEACHERS' ATTITUDE TOWARD CLASSROOM INTEGRATION OF ICT

Dear respondent,

Your honest responses to the content of this questionnaire are sought for. Any information provided will be used mainly for research purpose.

SECTION A: Supply the following information in the spaces provided by ticking ( ) the appropriate one.

Gender: Male ☐ Female ☐

Area of specialization: Build/woodwork ☐ Mech/Auto ☐ Elect ☐

KEY:SA (4),A (3),D (2) and SD (1)

SECTION B: Tick ( ) the options that correspond to your disposition to the items below**:**

Items	**In-service Basic Technology Teachers' Attitude toward Classroom Integration of ICT**	**SA**	**A**	**D**	**SD**
1	Use of ICT enhances students' learning in Basic Technology classroom.				
2	Use of ICT in Basic Technology classroom provides better learning experiences.				
3	Use of ICT-based instructional materials is more preferable to wall charts, flip charts, models etc				
4	Use of ICT tools to prepare instructional content in Basic Technology is easy and interesting				
5	I learn more from ICT than i do from books.				
6	In spite of challenges of using ICT for teaching and learning of Basic Technology, its classroom use is worthwhile				
7	I would work harder if I could use ICT in Basic Technology classroom.				
8	I have phobia for use of ICT in Basic Technology classroom.				
9	Use of ICT can make teaching and learning of Basic Technology content difficult and un-interesting.				
10	Use of instructional materials such as well charts, models etc are more preferable to use of ICT-based instructional materials				
11	I will not have anything to do with ICT in Basic Technology classroom.				
12	I prefer use of talk and chalk method only to use of computer, television, CD-player and multi-media projector in the Basic Technology classroom.				
13	Challenges of using ICT for teaching and learning of Basic Technology in the classroom are very discouraging				
14	Basic Technology teachers should not bother themselves to acquire ICT skills to facilitate its pedagogical integration if government or school management cannot sponsor such ICT training programme				

APPENDIX V

TEACHERS' COMPUTER ATTITUDE SCALE

Dear respondent,

Your honest responses to the content of this questionnaire are sought for. Any information provided will be used mainly for research purpose.

SECTION A: Supply the following information in the spaces provided by ticking ( ) the appropriate one.

Gender: Male ☐ Female ☐

Area of specialization: Build/woodwork ☐ Mech/Auto ☐ Elect ☐

SECTION B: Tick ( ) the options that correspond to your disposition to the items below**:**

Table 1: Items in the Computer Attitude Scale. **KEY:SA (4),A (3),D (2) and SD (1)**

Items	TEACHERS COMPUTER ATTITUDE	SA	A	D	SD
1	Computers make me feel uncomfortable				
2	Using a computer does not scare me at all				
3	If given the opportunity to use a computer, I am afraid that i might damage it in some way				
4	I hesitate to use a computer for fear of making mistakes i can't correct				
5	I hesitate to use a computer in case I look stupid				
6	I don't feel apprehensive about using a computer				
7	Computers help me improve my work better				
8	Computers make it possible to work more productively				
9	Computers can allow me to do more interesting and imaginative work				
10	Most things that a computer can be used for I can do just as well myself				
11	Computers can enhance the presentation of my work to a degree which justifies the extra effort				
12	I could probably teach myself most of the things I need to know about computers				
13	I can make the computer do what I want it to				
14	If I get problems using the computer, I can usually solve them one way or the other				
15	I do not need someone to tell me the best way to use a computer				
16	I am not in complete control when I use a computer				
17	I need an experienced person nearby when I use a computer				
18	I will use computers regularly throughout school				
19	I would avoid taking a job if I knew it involved working with computer				
20	I avoid coming into contact with computers in school				
21	I only use computers at school when I am told to				

APPENDIX VI

STUDENTS' ACADEMIC ACHIEVEMENT TEST IN BASIC TECHNOLOGY

Dear Student,

This test seeks to investigate your knowledge on Basic Technology. Please answer the questions as honestly as possible

Section A:Personal Data

Name(optional):……Class……

Gender: Male ☐ Female ☐

Section B: Do not start answering the question until you are told to do so.

Answer the question by ticking on the chosen answer.

Duration:40 Minutes.

1. _____ is the general care we give to our equipment so that they can be in good working condition.
   (a) Cleaning (b) covering (c) maintenance (d) packaging
2. We give general care to our appliances so that they can _____
   (a) Serve us well (b) be kept away from thieves (c) serve us longer (d) A & C
3. The following are simple maintenance methods except _____
   (a) Cleaning (b) dusting (c) packaging (d) oiling
4. Domestic appliances do not last longer when they _____
   (a) are used everyday (b) are used every week (c) lack maintenance (d) are not used everyday
5. Maintenance is necessary but not compulsory _____
   (a) Agree (b) Disagree (c) Undecided (d) None of the above
6. Your friend bought a new bicycle, what can he do to prolong its service life _____
   (a) Use it once in a while (b) keep it at home (c) carryout regular maintenance (d) None of the above
7. To keep an appliance in a good working condition the following may be required expect _____ (a) cleaning (b) washing (c) dusting (d) packaging
8. Using a soft cloth to clean an appliance is known as _____
   (a) Washing (b) dusting (c) cleaning (d) oiling
9. Appliances that require cleaning include the following except _____
   (a) Radio (b) Blender (c) Video player (d) Television

10. The type of dirt on radio and television is _____
    (a) Sand (b) dust (c) oil (d) all of the above
11. If the dirt on radio and television are not cleaned at regular interval, it can _____
    (a) Prolong their service life (b) reduce their service life (c) prevent them from being in good condition (d) B & C
12. The following describe simple maintenance of a television except _____
    (a) disconnect it from source of power (b) use soft brush to remove dust
    (c) use liquid detergent and water to wash (d) use soft cloth to clean it
13. Mr. Bright bought a new DVD player, tell him what he should not do during maintenance _____ (a) clean with soft cloth (b) use brush to remove dust (c) use soap and water (d) a and b
14. Using a soft brush to remove dust from domestic appliances is known as _____
(a) Cleaning (b) dusting (c) washing (d) oiling
15. Appliances that require, dusting include the following except _____
(a) radio (b) video player (c) water heater (d) television
16. The type of dirt that require dusting is _____
    (a) Oil (b) sand (c) dust (d) None of the above
    (a) If dusting is not carried on domestic appliances, like radio and television, it can _____cause electric shock (b) reduce its volume (c) reduce their service life (d) None of the above
17. The following describe simple maintenance of a television except _____
    (a) disconnect it from source of power (b) use soft brush to remove dust (c) use sponge, soap and water to wash (d) A & B
18. Mr. John bought a new television, tell him what he should not do during maintenance ____ (a) clean with oil (b) clean with brush (c) clean with soft cloth (d) None of the above
19. Using detergents, water and sponge to effect maintenance of kitchen wares is known as _____ (a) cleaning (b) dusting (c) washing (d) oiling
20. Appliances that require use of soap, water and sponge include the following except _____ (a) radio (b) kerosene stove (c) cutlery (d) pots
21. The type of dirt on kitchen wares include the following except _____ (a) food remnants (b) stains (c) sand (d) a and b
22. If the dirt on kitchen wares are not cleaned, it can _____
    (a) prolong their service life (b) reduce their service life (c) prevent them from being in good working condition (d) A & C

23. The following describe simple maintenance of kitchen wares except ___ (a) wash with soap, water and sponge (b) rinse and wash with clean water (c) hang in their respective cabinet (d) dusting
24. Mrs. Grace bought a new set of cutlery, tell her what she should not do during maintenance _____

    (a) wash with soap, water and sponge after use (b) rinse and wash with clean water (c) hang them in their respect rack (d) lubricate them after use
25. Lubricating the moving parts of an appliance is known as _____ (a) cleaning (b) dusting (c) oiling (d) washing
26. Appliance that requires lubricating is _____

    (a) spoon (b) knife (c) clipper (d) television
27. Lubricating moving parts of an appliance reduce _____

    (a) speed (b) volume (c) friction (d) None of the above
28. Oiling the moving parts of an appliance is necessary for the following reasons except _____ (a) reduce its service life (b) prolong its service life (c) keep it good working condition (d) None of the above
29. The following describe simple maintenance of a clipper except _____ (a) put oil before use (b) put oil after (c) wash with water and soap (d) a and b
30. Mr. Sam bought a new clipper, tell him what he should do during maintenance _____ (a) lubricate before use (b) lubricate after use (c) sharpen the blade at regular interval (d) all of the above
31. The type of maintenance that involve changing of damaged part is known as _____

    (a) cleaning (b) washing (c) replacement (d) dusting
32. Changing of damaged part in an appliance will _____ except (a) reduce the service life of the appliance (b) prolong the service life of the appliance (c) keep it in good working condition (d) None of the above

APPENDIX VII

KEY TO THE QUESTIONS

1.	C	18.	C
2.	D	19.	A
3.	C	20.	C
4.	C	21.	A
5.	B	22.	D
6.	C	23.	D
7.	D	24.	D
8.	C	25.	D
9.	B	26.	C
10.	B	27.	C
11.	D	28.	C
12.	C	29.	A
13.	D	30.	C
14.	B	31.	D
15.	C	32.	C
16.	C	33.	A
17.	C		

APPENDIX VIII

STUDENTS' COMPUTER ATTITUDE SCALE

Dear respondent,

Your honest responses to the content of this questionnaire are sought for. Any information provided will be used mainly for research purpose. Tick ( ) the options that correspond to your disposition to the items below:

Gender: Male ☐ Female ☐

SECTION B: Tick ( ) the options that correspond to your disposition to the items below**:**

Table 1: Items in the Computer Attitude Scale. **KEY:SA (4),A (3),D (2) and SD (1)**

Items	STUDENTS' COMPUTER ATTITUDE	SA	A	D	SD
1	Computers make me feel uncomfortable				
2	Using a computer does not scare me at all				
3	If given the opportunity to use a computer, I am afraid that I might damage it in some way				
4	I hesitate to use a computer for fear of making mistakes I can't correct				
5	I hesitate to use a computer in case I look stupid				
6	I don't feel apprehensive about using a computer				
7	Computers help me improve my work better				
8	Computers make it possible to work more productively				
9	Computers can allow me to do more interesting and imaginative work				
10	Most things that a computer can be used for I can do just as well myself				
11	Computers can enhance my preparation for school work to a degree which justifies the extra effort.				
12	I could probably teach myself most of the things I need to know about computers				
13	I can make the computer do what I want it to				
14	If I get problems using the computer, I can usually solve them one way or the other				
15	I do not need someone to tell me the best way to use a computer				
16	I am not in complete control when I use a computer				
17	I need an experienced person nearby when I use a computer				
18	I will use computers regularly throughout school				
19	I would avoid taking a job if I knew it involved working with computer				
20	I avoid coming into contact with computers in school				
21	I only use computers at school when I am told to				

APPENDIX IX

STUDENTS' ATTITUDE TOWARD BASIC TECHNOLOGY INVENTORY (SATBTI)

Dear respondent,

Your honest responses to the content of this questionnaire are sought for. Any information provided will be used mainly for research purpose. Tick ( ) the options that correspond to your disposition to the items below:

Name: ……

Gender: Male ☐ Female. ☐

KEY: SA (4), A (3), D (2) and SD (1)

Items	STUDENTS' ATTITUDE TOWARD BASIC TECHNOLOGY	SA	A	D	SD
1	Basic Technology is very easy to understand during teaching and learning in the classroom.				
2	Teaching and learning of Basic Technology is very interesting to me.				
3	I always look forward to having Basic Technology class.				
4	Basic Technology is one of my best subjects.				
5	I like Basic Technology subject.				
6	I always feel bored during Basic Technology lessons.				
7	I have little or no interest in Basic Technology.				
8	Basic Technology is difficult to understand because there is no practical demonstration during teaching and learning.				
9	Basic Technology is one of the subjects I do not like.				
10	If Basic Technology is not made compulsory on the school time table, I will not offer it.				

APPENDIX X

LESSON CONTENT

SIMPLE MAINTENANCE

Maintenance can be defined as the general care we give to our equipment so that they can serve us well, longer and be in good working condition.

Simple Maintenance Methods

Simple maintenance methods include cleaning, dusting, washing, oiling, and replacement of damaged parts.

Maintenance Materials and Equipment

Cleaning: This involves use of cleaning materials to remove dust or dirt on surfaces of appliances

Cleaning materials include:

- Soft cloth

Washing: This involves use of washing materials to remove dirt on surfaces of appliance

Washing materials include:

- Sponge
- Soap
- Liquid detergents
- Water

Dusting: This involves use of dusting materials to remove dust from surfaces of appliance

Dusting materials include:

- Soft brush
- Soft cloth

Oiling: This involve use of oiling materials and equipment to lubricate the moving parts of appliances

Oiling materials include:

- Lubricating oil

Oiling equipment include

- Oil can
- Oil gun

Replacement of damaged parts: This involves identifying damaged parts in an appliance and its replacement

APPENDIX XI

COMPUTER PRIOR - EXPERIENCE INVENTORY (BTSCEI)

Dear respondent,

Your honest responses to the content of this questionnaire are sought for. Any information provided will be used mainly for research purpose.

SECTION A

Supply the following information in the spaces provided by ticking ( ) the appropriate one.

Gender: Male ☐ Female ☐

Area of specialization: Build/woodwork ☐ Mech/Auto ☐ Elect ☐

SECTION B

Instruction: Rate the activities you carry out using computer under low, moderate and high as indicated below.

(Tick ( ) as appropriate).

Items	COMPUTER PRIOR-EXPERIENCE	Low	Moderate	High
1	I can carry out Word Processing (Typesetting and Editing) to:			
2.	I can copy document using: i. Flash drive			
	ii. DVD			
	iii VCD			
	Which of the following activities can you carry out using computer and Internet Technology (Tick (√) as appropriate)			
3.	I can Browse on Internet			
4.	Check mail on Internet			
5.	Down load on Internet			
	Which of the following activities can you carry out? (Tick) as appropriate)			
6.	Use of power point for presentation			
7.	Use of video camera to capture information			
8.	Transfer of information/Data from Video camera to computer			

APPENDIX XII

MODEL FOR USING ICT-BASED INSTRUCTIONAL APPROACH

1. Select a topic in Basic Technology
2. Identify relevant instructional objectives to be achieved.
3. Identify relevant instructional media that can be used to achieve these objectives.
4. Write a comprehensive lesson plan
5. Identify where you can get practical demonstration of the concept you want to expose to the learners which involves manipulation of materials, tools and equipment which will serves as instructional media.
6. After adequate planning and organization, use a camera phone to capture the learning experiences with specific and brief explanation during recording or capturing.
7. Save the information on the memory card and burn it on recordable CD.
8. Using DVD Player and Television monitor present this ICT-based instructional media in place of wall charts during teaching and learning in the classroom.

APPENDIX XIII

SENETORIAL DISTRICTS IN OGUN STATE

Ogun East

Ogun West

Ogun Central

LGAS IN OGUN- EAST SENATORIAL DISTRICT

Ijebu- Ode

Odogbolu

Ijebu- East

Ijebu- North

Ijebu- North East

Ogun Waterside

Sagamu

Remo- North

Ikenne

LGAS USED IN THE STUDY

Ijebu- Ode

Odogbolu

Remo North

SCHOOLS USED IN THE STUDY

Our Lady of Apostles Secondary School, Ijebu-Ode LGA

AUD Secondary School, Ijebu-Ode LGA

Molipa High School, Odogbolu LGA

Adeola Odutola College, Odogbolu LGA

CAC Grammar School, Remo- North LGA

Remo Secondary School, Remo- North LGA

APPENDIX XIV

OPERATIONAL WORKING GUIDE

(ICT Pedagogy Approach)

A. Learning experiences to be provided through the use if ICT – tool	
1.	
2.	
3.	
4.	
5.	

B. Sources of information (Tick (√) as appropriate	
• **Environment**	
• **Internet/computer**	
• **Textual**	
• **Graphics**	
• **Website**	

C. Media to capture the information (Tick (√) as appropriate	
• **Video camera**	
• **Flash drive**	
• **Disc**	

D. Media for classroom presentation (Tick (√) as appropriate	
• **VCD Presentation**	
• **Ion**	
• **E-mail**	
• **Design software:**	
ILS	
CBI	
CAI	
DES	
GRAPHIC	
• **Word processing**	
• **Power point**	
• **Television and video player**	
• **Computer**	
• **Cell phone**	

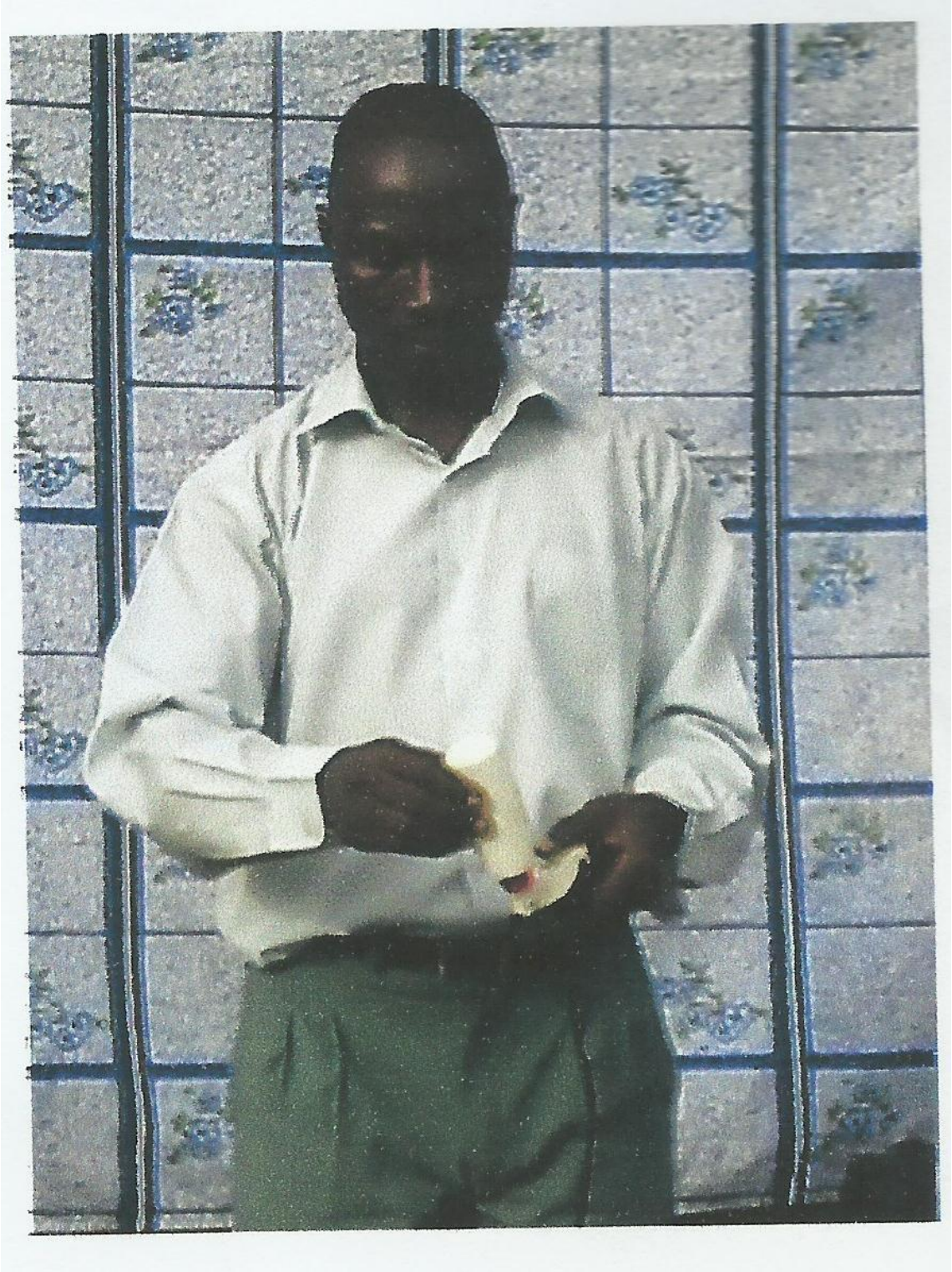
APPENDIX XV
LETTER OF INTRODUCTION

APPENDIX XVI
2010 JUNIOR SCHOOL CERTIFICATE EXAMINATION HIGHLIGHTS. MINISTRY OF EDUCATION, ABEOKUTA, OGUN STATE.

APPENDIX XVII
2011 JUNIOR SCHOOL CERTIFICATE EXAMINATION HIGHLIGHTS. MINISTRY OF EDUCATION, ABEOKUTA, OGUN STATE.

APPENDIX XVIII
2012 JUNIOR SCHOOL CERTICATE EXAMINATION HIGHLIGHTS. MINISTRY OF EDUCATION, ABEOKUTA, OGUN STATE.

APPENDIX XIX
MAITENANCE OF CLIPPER BEFORE USE (OILING)



APPENDIX XX
MAINTENANCE OF CLIPPER BEFORE USE (BRUSHING)

APPENDIX XXI
MAINTENANCE OF CLIPPER AFTER USE (OILING)

APPENDIX XXII
ADMINISTRATION OF PRE-TEST FOR BASIC TECHNOLOGYTEACHERS (EXPERIMENTAL GROUP)

APPENDIX XXIII
MAINTENACE OF ELECTRICAL APPLIANCE, VOLTAGE REGULATOR
(REPLACEMENT OF DAMAGED PART)

APPENDIX XXIV

MAINTENACE OF KITCHEN WEARS (WASHING)

APPENDIX XXV
ADMINISTRATION OF PRE-TEST AT OUR LADY OF APOSTLES SECONDARY SCHOOL, IJEBU-ODE LGA

APPENDIX XXVI
ADMINISTRATION OF TREATMENT FOR STUDENTS AT MOLIPA HIGH SCHOOL, ODOGBOLU LGA

APPENDIX XXVII
VIDEO PRESENTATION OF CLASSROOM INTEGRATION OF ICT AMONG BASIC TECHNOLOGY TEACHERS

APPENDIX XXVIII
TREATMENT, PRESENTATION OF ICT-BASED INSTRUCTIONAL RESOURCES AT CAC GRAMMAR SCHOOL, REMO LGA