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THESIS

ASSESSMENT OF ICT FACILITIES IN TEACHING AND LEARNING OF ELECTRICAL INSTALLATION AND MAINTENANCE WORK IN GOVERNMENT TECHNICAL

COLLEGE OF YOBE STATE, NIGERIA.

BY

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ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

DHAKA-BANGLADESH

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M.Sc.TE (EEE)

Thesis submitted in partial fulfillment of the requirement of the degree of **Master of Science in Technical Education (M.Sc. T.E)** with specialization in **Electrical and**

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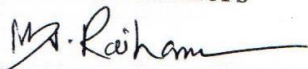
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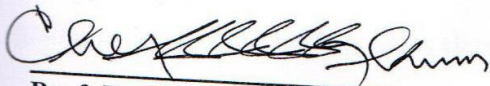### Department of Technical and Vocational Education (TVE)

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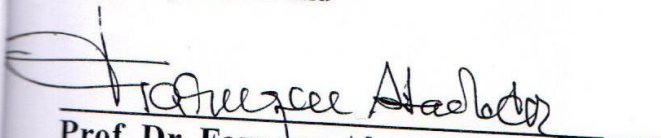
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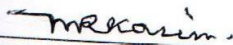(Supervisor)

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DEDICATION

I dedicate my thesis work to my parents and family members for their encouragement and prayers which make me fill strong, motivated and focus toward devoting my time, sleepless night in accomplishing my master program.

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TABLE OF CONTENTS

3.0   CHAPTER THREE

4.0. CHAPTER FOUR

5.0 CHAPTER FIVE

LIST OF TABLES

Abstract

This study assesses information and communication facilities for teaching and learning electrical installation and maintenance work in government technical college of Yobe state. Four research questions guided this study. Descriptive research (survey) design was adopted for the study. The samples used for this study consist of four principal and forty teachers making forty-four samples. Purposive sampling technique was used to select four schools from two educational zones in the state. The instrument used for data collection was a 47 questionnaire which also consist of check list developed by the researcher and administered to the respondent by the research assistant. The research questions were answered using mean and standard deviation which were analyzed using SPSS software version 20. The finding shows that ICTs facilities are not adequately available in most of the schools for teaching-learning of electrical installation and maintenance work and utilization is affected base on the constrain teachers are facing for effective utilization. In view of the findings it was recommended among others that Government and private organizations should partner with government in provision of adequate ICT facilities to schools and to ensure adequate electricity supply and internet service

CHAPTER ONE

INTRODUCTION

1.1 1.2. Background of the study

Learning is the process of acquiring practical and theoretical skills (knowledge) which is among the goals of education. The major goal of education is the acquisition of practical skills which is appropriate for the development of physical, mental social abilities, competences as well as preparing the students to live and contribute toward the development of his environment and the society at large (federal Republic of Nigeria, 2013). Technical education is the education given, with the aim of producing craftsmen/middle level manpower with practical skills for effective utilization of new technological device through technical college (FRN, 2008).

It is observed that technical and vocational education provides the workforce for employable skills, change in behavior needed at the work place (Chijioke J. O 2016).

Technical education can be defined as a formal training which provides the opportunities for the application of techniques such as applied science and mathematical principles for the services of humanity; while vocational education is the education given to an individual to enable him becomes self-reliance. Technical education aimed at providing skills and practical development needed by individual, vocational education is generally concerned with guiding principles for effective and efficient performance in any occupational field as argued by (Okoye and okwelle 2014). Technical and vocational education is a form of education which provide the preparation for employment in any industries and organization that is needed in the society which are most appropriately acquired in schools (Osuala 1981). TVET however equips learners not only with vocational skills but also with different types of skills, knowledge and attitude that are required for general and meaningful participation in workplace and life. It is an education which is designed to develop occupational skills (Butterfield 2010). It can therefore be seen that the primary objectives of TVET is to prepare the student in such a specific way that can enable them acquire all the necessary skills needed for paid or even self-employment in any occupation; and has been proven to be the best in providing jobs to the economically challenged youths in Nigeria. Technical colleges are government institution that provides vocational training to junior secondary school's leavers which are admitted into senior secondary school with full time vocational course of three years durations (okoro, 2006). Entrepreneurship can be defined as the

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education given to student with the aim of helping them acquire skills in other to become self-reliance and for anyone to become self-reliant he most has attained the required skills, attitude and behavior that can help him explore in his environment. It is the type of education that enables the student or the recipient to fine out the good things in his environment, explore it for self-reliance without dependent on anybody (Anyakoha 1993 in Ementa, 2013). The purpose of entrepreneurship education is to bridge the gap between student graduating from secondary schools and the world of unemployment in other to limit the number of graduates who has nothing to do after graduation and to reduce the rate of unskilled and incompetent graduates in the industries. The basic or fundamental reasons for trade/entrepreneurial subject inclusion as part of senior secondary school curriculum are;

- ❖ To achieve the objective of the Millennium Development Goal (MDGs) and the National Economic Empowerment and Development Goal (NEEDs)
- ❖ To ensure that secondary school graduate have the required vocational skills with competency necessary for employment or self-reliance with the aim of eradicating poverty
- ❖ To address the scarcity of technical skill, need and meet the demand of the growing skills need in Nigeria.
- ❖ The aim of the new curriculum is to provide job, poverty alleviation and wealth generation
- ❖ Trade entrepreneur education aim at providing skills, knowledge and motivating the student to start a profitable business
- ❖ To provide tainting for self-employment
- ❖ It is assumed that the school graduate will develop the spirit of enterprise and industry

Trade/ entrepreneurship are among the core subjects which cut across the four mandatory subjects in the new secondary school curriculum. The subject includes English language, General Mathematics, Civil Education and Trades/entrepreneurship which means that every student must offer one entrepreneurship subject irrespective of his discipline either science, technical, arts or commercial and must register the course after completing three years of study in the public examination (NECO, NABTEB or WAEC).

According to Nigeria Educational Research and Development Council NERDC (2008), the secondary school educational curriculum consists of thirty-four entrepreneurship trade subjects,every school in Nigeria is at the liberty to select one or more entrepreneurship subjects for the students and a student must take one entrepreneurship subjectfrom senior secondary school one (SS1) offer it till the end of his secondary school 3 (SS3). The main objective is to ensure that every secondary school graduate is prepared for higher education and also gain the required skills needed to eradicate poverty, wealth generation and job creation. (Sunday N. Orji 2013).

Information and communication technology (ICT) could be defined in different ways based on its uses and utilities. In this study ICT could be define as teaching-learning through multimedia, internet, enable smart board, interactive white board, projector, and computer assisted learning (CAL). Amuchie, (2015) in Mndzebele, N. dludlu, M. Mndebele, C.B.S. (2018) defines Information and communication technology (ICT) as a systematic process of gathering, processing, storing, sending and retrieving of information through print broadcast, computing and telecommunications media. Onwuagboke and singh (2014) urged that ICT facilities can be used in teaching and learning which are not only limited to the following; computers, projectors, multimedia, internet, interactive white board and video players VCDs and electronic notice boards live. It is overbearing and intimidating even as the 21st century is emphasizing technological advancement; most of the teachers seems not to be consciously involved in the development. Indirectly, student performance and their academic orientated skills in the job market is been affected. The students learning process, is therefore facilitated sometimes faster than when a classroom teacher is involved. This process is referring to as Computer Assisted Learning (CAL). The computer can also provides instruction to students, ask questions, grade students' performance and determine by it whether new topics are to be taught or to repeat some part of the lesson just taught. This process is often referred to as Computer Aid Instruction (CAI). Computers can equally be used in the marking of multiple-choice examination papers and in the processing of examination results for schools and many examination boards. Computers are used to present instruction by means of modern teaching method known as Computer Assisted Instruction (CAI). Hence information and communication technology in our educational system is highly necessary as we launching it into the Millennium Development Goals (MDGs) and targeting the Sustainable Development Goal (SDGs). As a teacher, one needs

to improve learning instruction as well as communicate effectively. Basically, utilization of information and communication technology as a teaching aids for teachers make the art of teaching more effective and dynamic, making learning more concrete, real, immediate and retentive. Subsequently, it makes the dual process of teaching and learning more pleasurable without reducing from its level of efficiency and effectiveness (Adegbemile, 2012).

1.3. Statement of the Problems

Information and Communication technology (ICT) are already a vital factor in successful development of education in Nigeria but There are some problems affecting the successful implementation of information and communication technology in teaching and learning of electrical installation and maintenance work (EIAMW) in government technical colleges are, inadequate facilities, poor power supply, unwillingness of the teachers to adjust to the use of technology in teaching, lack of internet, lake of required software's etc. The problems of information and communication technology in Nigerian secondary schools among which are poor infrastructure, inadequate ICT facilities in schools, lack of teachers professional knowledge and technical knowhow, irregular power supply, ICT facilities are still expensive, broken down ICT facilities, inadequate facilities at the ICT centre, lack of internet or slow connectivity, environmental factors, time constraints and poor maintenance culture (torruam and Abur, 2013).These are some of the problems affecting the use of information and communication technology facilities for teaching and learning Electrical Installation and Maintenance Work in government Technical colleges. This study was meant to assess the availability, functionality and utilization of information and communication technology facilities for teaching and learning Electrical Installation and Maintenance Work (EIAMW) in government technical colleges of Yobe State.

1.4. Purpose of the Study

The purpose of this study is to assess the availability, functionality and utilization of information and communication technology facilities for teaching and learning Electrical Installation and Maintenance Work in government Technical colleges in Yobe state. Specifically, the study sought to:

i. Determine the availability of ICT facilities to teachers in teaching electrical installation and maintenance work.

ii. Determine the functionality of ICT facilities to teachers in teaching electrical installation and maintenance work.

iii. Determine the utilization of ICT facilities by teachers in teaching electrical installation and maintenance work.

iv. Determine the possible constraints to the effective utilization of ICT facilities in teaching Electrical installation and maintenance work.

1.5. Research Questions

The following research questions were raised to guide this study:

1. What are the level of availability of information and communication technology (ICT) facilities for teaching electrical installation and maintenance work?

2. What are the levels of functionality of information and communication technology (ICT) facilities for teaching electrical installation and maintenance work?

3. What are the extent of information and communication technology (ICT) facilities utilization in teaching electrical installation and maintenance work?

4. What are the constraints to the effective utilization, of information and communication technology (ICT) facilities in teaching electrical installation and maintenance work?

1.6 Significance of the Study

It is expected that his study will make significant contribution and beneficial in using ICT facilities for teaching and learning of electrical installation and maintenance work to;

Teachers: The benefit from this study will help teachers to explore their knowledge in the field of ICT, make teaching and learning more interesting, it will enhance interactivity in teaching and learning, it will provide easy means of communication in teaching and learning, it will make

teachers to be up-to-date in their discipline and enhance quality and efficiency of work (teaching and learning).

Head Teachers: The benefit from this study will help the head teachers to develop awareness about the availability, functionality and utilization of ICT facilities and teachers' efficiency and effectiveness in using ICT facilities in teaching and learning process. And give feedback or report to the ministry

Students: The benefit from this study to the students is that, it will assist students in multimedia learning environments to have more opportunities test their work or experiments within a given time period because setting and resetting up of electrical experiments is no more required. It will enable students become more effective and independent learners, placing all learners on equal footing, (students can learn with ICT facilities without any fear, shame or other psychological barriers etc.) it will also motivate students to learn and encourage students in problem-solving and participation in classroom activities.

Ministry of Education and Science and Technical School Board: These organizations can make use of these findings by integrating it in the school's curriculum so that teaching through simulation program can be carried out by teachers effectively.

Researchers: The results of the finding will be of benefits to those undergoing research work, that want to explore more in the field of assessment of ICT facilities for teaching and learning in government technical colleges in Yobe State.

1.7. Limitation of the Study

This research work is aimed at assessing ICTs facilities in teaching and learning electrical installation and maintenance work in government Technical colleges in Yobe State, Nigeria. The research could have extended to many Technical colleges throughout the State but due to some factors such as financial problem and time the study was limited to four (4) approved government Technical colleges in Two (2) Educational zone in Yobe State, Nigeria.

1.8. Definition of terms

Assessment-an assessment it is a way of supporting learning so that teachers and other state holders can understand the depth and breadth of learning next steps and progress can be discussed and planned.

Information- it is the gathering of knowledge through processing of data**.**

Communication- it is the process of exchange information between individuals through a common system of symbols, signs, behavior.

Technology- it is the use of scientific knowledge for practical purposes/ applications to solve problem either in the industries or in our day to day activities.

Information communication technology (ICT) - it is the technology that provides access to information through the use of telecommunication e.g. internet wireless network, and other communication medium.

Facilities- are anything that can facilitates or make possible an action to fulfill a particular function.

Teaching- it is the act or process of imparting knowledge and skills from the teacher to the learner.

Learning- is the process of acquiring new, or modifying existing, knowledge, behaviors, skills, values, or preferences.

Electrical Installation and Maintenance Work- it is a process of providing technical training to individual required for job satisfaction in the electrical industries and for self reliance.

Technical Colleges: Technical colleges are post-primary institutions with the following main objectives:

1. Providing knowledge and skills necessary for employment in a particular trade or occupation.

2. Preparing suitable candidates for entry into tertiary institutions offering technological courses.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Education is knowledge; knowledge is the possession and expression of useful and factual information. Consequently, man's ability to generate, organize, assimilate and utilize information stands him out. Knowledge, justify his status as the most advance (intellectual) in the animal world. Thus, it is not an overstatement to say for any country to grow, academically, technologically, economically and socially, there is need for its citizens to be ICT (computer) literate and numerate (Adeleke, 2003 in Okah, 2012).

Extensive review of literature was carried out in the following areas:

i.   Definitions of electrical installation and maintenance work.

ii. Definition and Nature of Electricity.

iii. Computer Assisted Learning and Computer Managed Instruction

iv. General Uses of Computer as Tools

v.   Information and Communication Technology and Technology Education

vi. Empirical Studies on ICT Facilities Availability and Utilization in Instructional Developmemt

vii. Teachers and Instructional Application of Information and Communication Technology

viii. The Need for Information and Communication in Nigerian Secondary Schools

ix. Information and Communication Technology Application in Nigerian Secondary Schools

x.   Information and Communication Technology-Driven Instructional Aids

xi. Application of Information and Communication Technology in Designing Instructional Materials for Electrical installation and maintenance work.

2.2. Definitions of electrical installation and maintenance work.

Electrical installation and maintenance work is an entrepreneurship trade program offered in senior technical colleges which provides practical exercise and maintenance in all kind of electrical system/ installation and circuit. Base on the above statement, the National board for Technical Education (NBTE, 2004) urged that electrical installation technicians/ craftsmen are expected to install, maintain, test, inspect, diagnose, services and repair of kind of electrical equipment and machines with or without manual guide. A well trained craftsman is expected to be capable of making electrical drawing, repairing and maintaining of all electrical works in the industries and residential building. Ekwe (2009) maintain that electrical installation work student requires competent skills, adequate facilities, tools and practical experiences for skills acquisition so as to strive toward job creation and self reliance. Ogwa (2016) Electrical installation and maintenance work is design to provide technical training to individual in other to meet the demands required in electrical industry and the need of individual students allowing them to identify their career objectives. Electricity is a good servant but a bad master and so before anyone can install a safe and efficient electrical system, essential for him to be familiar with the nature of electricity and the danger inherent in its use.

Federal Republic of Nigeria, (2014) Electrical installation and maintenance work is one of the trade subjects among the 34 trade subjects of the entrepreneurship education curricula offered in technical colleges in Nigeria with the main objectives to provide trained manpower in the field of applied science, commerce and technology at sub professional grades. Electrical installation and maintenance work is a subject offered in technical colleges which prepare an individual with the required skill for job-satisfaction needed for employment and self-reliance. Ogwa (2015), Electrical installation and maintenance work is design to provide technical training to individual in other to meet the demands required in electrical industry and the need of individual students allowing them to identify their career objectives. It is assumed that student who undergoes technical training in electrical installation trades are expected to possess skills of excellence in electrical installation work, installation of electrical machines and equipment, testing and inspection of electrical installations, maintain nerves of machines and equipment, winding of electrical machines, repair of electrical machine etc. However, learning how to construct a

domestic wiring system can consume a lot of time because it involves connecting wires, power supply, switches, and other electrical devices together. Safety of individual student is of paramount importance because any mistakes made in the wiring process, the student run the risk of experiencing the high voltage electric shock. Hence, an alternative learning context will be very important whereby students can easily set up and undo their experiment safely within the regular laboratory's hours without the risk of electric shock which could benefit students learning electrical installation and maintenance work.

2.3. Definitions and Nature of Electricity

Electricity is the most common form of energy. Electricity is used for various applications such as lightening, transportation, cooking, communication, production of various goods in factories and many more.

None of us know exactly what electricity is. The concept of electricity and theories behind it can be developed by observing it different behaviours. For observing nature of electricity, it is necessary to study the structure of matters. Every substance in this universe is made up of extremely small particles known as molecules. The molecule is the smallest particle of a substance into which all the identities of that substance are present. The molecules are made up of further smaller particles known as atoms. An atom is the smallest particle of an element that can exist. The basic nature of electricity is, whenever a negatively charged body is connected to a positively charged body by means of conductor, the excess electrons of negative body start flowing towards the positive body to compensate the lack of electrons in the positive body (John, 2007).Electricity occurs due to several types of physics:

1. **Electric charge:** a property of some subatomic particles, which determines their electromagnetic interactions. Electrically charged matter is influence by, and produces electromagnetic fields.

2. **Electric current:** a movement or flow of electrically charged particles, typically measured in amperes.

3. **Electric field:** an especially simple type of electromagnetic field produced by an electric charge even when it is not moving. The electric field produces a force on other charges in it vicinity.

4. **Electric potential:** the capacity for an electric field to do work on an electric charge, typically measured in volts.

5. **Electric power:** where electric current is use to energise equipment.

Electricity can be defined as the flow of electrons (or positive "holes"). But Bird and Jones (2004) opines that electricity is the flow of electrical energy through some conductive materials. John (2007) defines electricity as the set of physical phenomena associated with the presence and flow of electric charge. However, electricity is defined as a form of energy from charged particles usually supply as electric currents, through the cables, wires for lightening, heating and driving machines etc.

2.4. Computer Assisted Learning (CAL) and Computer Managed Instruction (CMI)

The term computer assisted learning (CAL) covers a range of computer-based packages which aim to provide interactive instruction usually in a specific subject area and many predate the internet (Olurunsola, 2007). CAL has to do with the use of computers or it associated programmes to generate instructional learning materials that will facilitate the understanding of the learners in different disciplines (Bandele, 2006). These CAL range from sophisticated and expensive commercial package to application developed by project in other educational institutions or national initiative to single solutions developed by individual with no finding or support to tackle very local problem.

In general, the use of computers in education through CAL has been sporadic (Kwache, 2007) a great deal of effort was expected with little general effort. Many of these academic that took part in the earlier crusade are now cynical about the effectiveness of computers in teaching. Computer assisted learning (CAL) an encompassing term which according to Ajayi (2008) refers to two major use of computer in education.

2.4.1. Computer Assisted instruction (CAI)

The first is described as learning through computer, in CAI instructional sequence and questions must first be pre-programmed, and then the students use the pre-programmed instructional material in an interactive fashion. Ambiola (1988) in Adeyemi and Olaleye, (2012) described CAI as the use of computers to provide instructional learning experiences directly to the learners by stimulating teaching and learning situations.

Computer assisted instruction (CAI) is an interactive instructional technique whereby a computer is used to present the instructional material and monitor the learning that take place (Jimoh, 2007). Computer assisted instruction it is a self-learning technique, usually offline/online, involving interaction of the students with programmed instructional materials. CAI uses a combination of text, graphics, sound and video in enhancing the Learning process. The computer has many purposes in the classroom and it can be utilized to help a student in all areas of the curriculum. The CAI allows students to progress at their own pace and work individually or problem solve in a group (Adeyemi and Olaleye, 2012). .Busstra (2002) argued that, ICT is creating and coursing a revolution and if the educational sectors refuse to join, it will not only be outdated but also will be out of competition in the educational market. Ikwuka, (2012) computer aided Instruction CAI is one of the most recent technological media information and communication technology has introduced into the teaching and learning process. Okah, (2012) emphasized that the use of ICT can be use to improve the quality of education, expand learning opportunity, and ensure that education is accessible to all. Therefore, the use of ICT-driven instructional aide in teaching and learning process will assists the schools to achieve the stated aims and objectives of electrical installation and maintenance work in Technical colleges. ICT as an educational tool can assist in complementing teaching and learning in every aspect of the school curriculum. Teaching and learning is the main aim of any educational institution. Robert-Okah, (2009), stresses that teaching as the main function of education is of immense important because it has to do with knowledge and acquisition of skill. Computer guides one through a course of instruction at a video display unit in such a way to facilitate understanding of the subject matter Opportunities for CAI in the classroom are in the areas of drill and practice, tutorials, simulations and demonstrations, designing, data collection and retrieval, analysis and games etc.

2.4.2. Computer Managed Instruction (CMI)

Computer managed instruction, is an instructional strategy whereby the computer is used to provide learning objectives, learning resources, record keeping, progress tracking, and assessment of learner's performance (Olurunsola, 2007). Computer based tools and applications are used to assist the teacher or school administrators in the management of the learners and Instructional Process. In this instructional Process, Computer mainly manages student instructional activities. This is accomplished by allocating or rescheduling learning materials and physical resources for each student, providing the students access to text question, grading, examination or assignment, providing diagnosis of learning performance based upon test performance scores, prescribing different instructional activities according to the students' performance and/or rate of programmes and record keeping (Onabanjo, 2000 in Adeyemi and Olaleye, 2012). Computer based tools and applications are used to assist the teacher or school administrator in the management of the learner and instructional process (Okoli, 2007). Computer managed instruction (CMI) provides an instruction with ways to create and deliver content, monitor students' participation and assess student's performance.

2.5. General Uses of computer as Tools

Using computer as a tool involves writing computer programme to solve variety of problems, it is described as learning with computers or simpler, using computer as tools (Nwafor, 2005). Computer as tools has a wide range application in education (teaching and learning) and used in instructional system as follows:

1. It can be used by the teacher to review skill already taught.

2. It can help the teacher to go over and over a set of instructional procedures over and over again.

3. It implements traditional instruction by reinforcing or expanding knowledge (Olurunsola, 2007 p.80).

In addition, Ikenga, Akiti and Onyemah (2009) viewed a variety of sophisticated programming that has become available. This permits students to access and/or create graph, audio and video

materials as part of their programming repertoire included in the set of tools are database, spread sheets, telecommunication and processing application packages.

2.6. Empirical Studies on ICT Facilities Availability and Utilization in Instructional Development

The efficacy of ICT in secondary education has been proved beyond reasonable doubt. It has been known to enhance educational opportunities of individuals and groups constrained from attending traditional institutions as well as the use of computers as tutors for drills and practice as well as instructional delivery (Umoren 2006). The unfortunate thing is that, ICT facilities are beyond the reach of secondary school teachers and as such, they cannot access them for the purpose of instructional development. Not much was found on Studies available on ICT availability and utilization in secondary schools in Idoko and Ademu (2010), found out that ICT availability often been one of the most important obstacles to technology adoption and integration in learning. They indicated that there is urgent need for more computers if a country is to successfully integrate ICT in public secondary schools (Pp.177-178).   Ezeoba (2007) carried out an investigation of ICT availability in schools in Onitsha on 100 secondary school teachers which revealed that the media availability average was less than 50%. It also found out that the degree of utilization in instructional delivery was that teachers used mostly books and over 60% did not use ICT facilities at all. Idoko and Ademu (2010) in an investigation of the challenges of ICT for teaching/learning as perceived by agricultural science teachers in 210 secondary schools from the three educational zones in Kogi State also found that ICT facilities were not available in secondary schools (Pp. 177-183).   Similarly, Fakeye (2010) also investigated English language teachers' knowledge and use of ICT in Ibadan Southwest LGA of Oyo State and found that availability of computers and their connectivity to the internet was non-existent in virtually all the school studied and utilization, which is dependent on availability, and because availability is poor, thus, usability was also found to be poor (Pp.270 – 276).

2.7. Information and Communication Technology and Technology Education

Technology education has been a kind of education that requires the use of equipment and machine and the presence of a well package information and communication technology (ICT) policy should enhance the delivery of knowledge in that realm (Ofudu, 2007). Importance of

information and communication technology (ICT) in the management of technology education in Nigeria is in double of advantage to learners and teachers as far as ICT are concerned. ICT related tools can make institution and economy more productive, enhance skills and learning, improves government at all levels (Bandele, 2006).

Information communication technologies (ICTs) are information handling tools that are used to produce, store, and process, distribute and exchange information. These different tools are now able to work together, and combine to form networked world- which reaches into every corner of the globe (UNDP, 2006). It is an increasingly powerful tool for participating in global markets, promoting political accountability; improving the delivery of basic services; and enhancing local development opportunities (UNDP, 2006). To Ogunsola (2005) ICT "is an electronic based system of information transmission, reception, processing and retrieval, which has drastically changed the way we think, the way we live and the environment in which we live". It can be used to access global knowledge and communication with other people. Students who use ICTs gain deeper understanding of complex topics and concepts and are more likely to recall information and use it to solve problems outside the classroom (Apple Computer, 2002 in Torruam and Abur, 2013). In addition, through ICT, students extend and deepen their knowledge, investigation, and inquiry according to their needs and interest when access to information is available on multiple levels (CEO Forum on Education and Technology, 2005).

2.8 Teachers and Instructional Applications of Information and Communication Technology

Many different types of technology can be used to support and enhance learning. Everything from video content and digital movie making to laptop computing and handheld technologies has been used in classrooms (Tella, Toyobo and Adika, 2010). Similarly, new uses of technology such as pod casting are constantly emerging (Marshall, 2002 in Tella, Toyobo and Adika, 2010). To Marshal, various technologies deliver different kinds of content and serve different purposes in the classroom. Word processing and e-mail promote communication skills; database and spreadsheet programmes promote organizational skills; and modeling software promotes the understanding of Science and Mathematics concepts. It is important to consider how these electronic technologies differ and what characteristics make them important as vehicles for education (Berker, 1994 in Ezeoba, 2007). Technologies available in classrooms today ranges

from simple tool-based applications (such as word processors), to online repositories of scientific data. Others are primary historical documents, handheld computers, closed-circuit television channels, and two-way distance learning classrooms. Prensky (2005) asserts that even the cell phones that many now carry with them can be used to learn. According to Lei and Zhao (2006) each technology is likely to play a different role in students learning. Rather than trying to describe the impact of all technologies as if they were the same, therefore, they is the need to think about what kind of technologies are being used in the classroom and for what purposes. Two general distinctions could then be observed from the literature. Students can learn from computers where technology are used essentially as tutors and serve to increase student's basic skills and knowledge. Moreover, they can learn with computers where technology is used as tool that can be applied to a variety of goals in the learning process and can serve as a resource to help develop higher order thinking, creativity and research skills (Zhang, 2005). According to Imam, (2005), the primary form of student learning from computers is described as Discrete Educational Software (DES), integrated learning system (ILS), Computer-assisted Instruction (CAI), and Computer-based instruction (CBI). These software applications are also the most widely available applications of educational technology in schools today, along with word-processing software, and have assisted in classroom for more than 20 years (Becker, Ravity and Wong, 1999 in Tella, Toyobo and Adika 2010). Imam, (2005) explains that teachers use DES not only to supplement instruction, as in the past, but to introduce topics, provide means for self study, and offer opportunities to learn concepts otherwise inaccessible to students. The software also manifests two key assumptions about how computers can assist learning. First, the users' ability to interact with the software is narrowly defined in ways designed specifically to promote learning with the tools. Second, computers are viewed as a medium for learning, rather than as tools that could support further learning. As DES is recognized as the commonly used approach to computer use in student learning, in more recent years, use of computers in schools has grown more diversified as educators recognize the potential of learning with technology as a means for enhancing students reasoning and problem-solving abilities. Zhang (2005) notes that "this shift which has been driven by the plethora of new information and communication devices now increasingly available to students in school and at home, each of which offers new affordances to teachers and students alike for improving student achievement and for meeting the demand for 21st century skills."

2.9. The Need for Information and Communication Technology Application in Nigerian Secondary Schools

Improved secondary education is essential to the creation of effective human capital in any country (Evoh, 2007). The need for ICT in Nigerian secondary schools cannot be overemphasized in this technological-driven age; everyone requires ICT competence to survive. Organizations are finding it very necessary to train and retrain their employees to establish or increase their knowledge on computers and other ICT facilities (Adomi and Anie, 2006). This calls for early acquisition of ICT skills by students.

The ability to use the computers effectively has become an essential part of everyone's education. For any nation to develop, emphasis must be given to education in relation to ICT which is the pivot that holds the growth and development (Adomi and Kpangban, 2010). The demand for computer/ICT literacy is increasing in Nigeria because employees realize that computers and other ICT facilities can enhance efficiency (Adomi, 2006). On other hand, employees have also realized that computers can be threat to their jobs, and the only way to enhance job security is to become computer literate (Adomi and Kpangban, 2010). With the high demand for computer literacy, the teaching and learning these skills is a concern among professionals. This is also true of other ICT components.

New instructional techniques that use ICT provide a different modality of instruments for the student, ICT use allows for increased individualization of learning. In schools where new technologies are used, students have access to tools that adjust to their attention span and provide valuable and immediate feedback for literacy enhancement which is currently not fully implemented in the Nigerian school system (Enuku and Enuku, 2000 in Adomi and Kpangban, 2010). Information and communication technology application and use will prove beneficial in improving Nigeria's educational system and giving students a better education. A technologically-advanced workforce will lead to ICT growth in Nigeria, with potential to improve military technology and telecommunications, Media communication and skilled ICTs professionals who are well equipped in solving information technology problems in Nigeria and parts of the world, (Goshit, 2006).

2.10. Information and Communication Technology Application in Nigeria Secondary Schools

There are developments in the Nigerian education sector which indicate some level of ICT application in the secondary schools. The federal government of Nigeria in the national policy on education (Federal Republic of Nigeria, 2004), recognizes the prominent role of ICTs into education in Nigeria. To actualize the goal, the document states that the government will provide basic infrastructure and training at the primary school. At the junior secondary school, computer education has been made a pre-vocational elective, and is a vocational elective at the senior secondary. It is also the intention of government to provide necessary infrastructure and training for the integration of information and communication technologies in the secondary school system (FRN, 2004).

It should be noted that 2004 was not the first attempt the Nigerian government made to introduce computer education in schools. In 1988, the Nigerian government enacted a policy on computer education. The plan was to establish pilot schools and diffuse computer education innovation first to all secondary schools, and then to primary schools. Unfortunately, the project did not really take off beyond the distribution and installation of personal computers (Okebukola, 1997 in Aduwa-Ogiegbaen and Iyamu, 2005).

The federal ministry of education has launched an ICT-driven project know as school net (www.Snng.org) (Federal Republic of Nigeria, 2006), which was intended to equip all schools in Nigeria with computers and communications technologies. In June 2003, at the African summit of world Economic forum held in Durban, South Africa, the New Partnership for African Development (NEPAD) launched the e-schools initiative, intended to equip all African high schools with information and communication technology (ICT) equipment including computers, radio and television sets, phones and fax machines, communication equipment, scanners, digital cameras and copiers, among other things (Adomi and Kpangban, 2010). It is also meant to connect African students to the internet. The NEPAD capacity-building initiative will be executed over a ten years period, with high school component being completed in the first five years. Three phases are envisaged, with fifteen to twenty countries in each phase. The phases are to be staggered, and estimated 600,100 schools are expected to benefit. The aim of the initiative is to impart information and communication technology (ICT) skills to young Africans in

primary and secondary schools, and to harness ICT to improve, enrich, and expand education in African countries (Aginam, 2006).

The Nigeria federal government has commissioned a Mobile Internet Unit (MIU) operated by the Nigerian National Information Technology Development Agency (NITDA). The MIU is a locally-made bus that has been converted into mobile training and cyber centre. Its interior has ten workstations all networked and connected to the internet. The MIU is also equipped with printers, photocopiers and a number of multimedia facilities (Adomi and Kpangban, 2010). Internet is provided via VSAT with a 1.2m dish mounted on the roof of the bus. It is also equipped with a small electric generator to ensure regular power supply. The MIU takes the internet to places areas and various primary and high schools (Ajayi, 2003 in Adomi and Kpangban, 2010). The number of buses is so small, however, that most rural areas and schools have been made to ensure that information and communication technologies are available and used in Nigerian secondary schools the level of uptake is still now.

2.11. Information and Communication Technology-Driven Instructional Aids

The information and communication technology-driven instructional aids mostly adopted by most of the Nigerian institutions these days are in form of prepared lesson on floppy diskettes, CD-ROMS that can be played as at when the need arises. This has limited advantage because of the number of students per computer system in which most of these facilities are not interactive enough as compare with when lesson is received in real time over the internet (Kamba, 2009) as the case are with most new generation well-meaning institutions especially in the advance societies. Torruam and Abur (2013 p.512) observed that today, some basic ICT-Driven Instructional Aids (table 1) to echo in our minds when talk of ICT-Driven Instructional Aids would not be far from the following:

Table 2.1: List of some educational technology and ICT driven Instructional aids

Flexible	Laboratory	Fixed/mobile	Mobile
Television	Scientific Tools	computers	Mobile Phone
Satellite Instruments	Receivers Technical	Storage Devices	Memory Readers

Radio	Medical Apparatus	Internet/email/social medias	iPods
Recorders	Agricultural Implement	Smart Boards/Touch screens	iPads
Cameras video/picture/CCTV	Engineering Facilities	Plain Screens	Androids
Projectors/Beams	Art Costumes	Robots	iPhones
Video Games	Language Tools	Avatars	Calculators
Mp3-4 Players	Books and Other Devices	Cables	PDAs

2.12. How ICT-Driven Instructional Aids Can Improve Qualitative Education in Nigeria

Researchers have commented immensely in the use of ICT-driven instructional aids in any educational processes, that the use cannot be over-emphasized. Abujaber (1987 in Torruam and Abur, 2013) added that, the importance of instructional materials for both teacher and students cannot be over emphasized. The use of ICT-driven instructional aids is essential to support teaching and learning because other phenomenal cannot be easily expressed without the support of graphics maps, video, pictures etc. In concrete terms, ICT-driven instructional aids media has enhanced teaching and learning through its dynamic, interactive, and engaging content; it has provided real opportunities for individualized instruction. Information and communication technology (ICT) driven instructional aids has the potential to accelerate, enrich, and deepen skills; motivate and engage students in learning; help to relate school experiences to work practices; help to create economic viability for tomorrow's workers; contribute to radical changes in school; strengthen teaching, and provide opportunities for connection between the school and the world (Dankaro and Jude, 2012). Information communication technology (ICT) can make the school more efficient and productive, thereby engendering a variety of tools to enhance and facilitate teachers' professional activities (Yusuf, 2005). Torruam and Abur (2013

p.513-514) Suggest the importance and the usefulness of ICT-driven instructional aids in teaching and learning are explained under the following headings:

1. Stimulation of Students' Interest

In teaching-learning process, there is the need to generate, arouse, motivate and maintain students' interest. If the learners' interest is build properly, learning can take place effectively. As ICT-driven instructional aids have the potentials if effectively used for regulating the pace of information flow among different class of learners under the same classroom (Ajayi, 2008). ICT-driven instructional aids address individual differences. Students are arouse with the nature and the beautiful appearance of the materials which will make them to Settle down and learn what the teacher had Prepared to teach. Anyawu (2003 in Torruam and Abur 2013) agreed and based on investigations those pictures-stimulates and help further study, helps children to take active interest in the topic presented.

2. Concretize Abstract Issues or Topics in Teaching and Learning Process

The use of ICT-driven instructional aids in teaching and learning process makes learning real, practical and more permanents to the learners. It makes conceptual abstraction more meaningful. Esu (2004) sates that; instructional materials are valuable assets in learning situations because they make lessons practical and realistic. They area the pivots on which the wheels of the teaching-learning process rotate. Since its concretize issues, it then facilitate revision (recall) activities and provide very unique opportunities for self and group evaluation for the teacher and the students alike (Jimoh, 2008). It captures the student intellect and eliminates boredom; make the work easier, neater, and boosting for clarity and more appeal.

3. Creating of Effective Communication

ICT-driven instructional aids if properly used allow for a flow and transmission of ideal from the teacher to the students and likewise from the students to the teacher or from one group to other (Nwite, 2007). The learners will be able to see, touch, spell what is been talked about by the teacher and be curious to ask questions that would be very helpful for effective evaluation (formative) of the teacher and instructions in subject matter (Torruam and Abur, 2013).

4. Use for Mass Instruction and Taking Care of a Wide Audience

With the use of projected and electronic materials such as television, overhead transparencies and computer especially, instructions are packaged in a very broad   manners and which take care of wide range of learners in a classroom with less stress and time (Dankaro and Jude, 2012). Many students will be able to learn faster as the package takes care of various learners' interest at the same time. Teacher can handle a very large class conveniently as the teacher is guiding and displaying the instructional materials on the wall with the use of projector (Adomi, 2006).

5. Providing Meaning and Useful Sources of Information to Teachers and Learners

Teachers are up to date and able to provide for reliable and useful information for the learners with the use of ICT-driven instructional aids, it can effectively be used to ultimate, shorten information from various sources for the purpose of comparison and contrasting ideas (Nzewi, 2009). It helps in perception and retention of information or knowledge in learners.

6. It Helps in Developing a Continuity of Reasoning and Coherence of Thought

Disciplines that are integrated course of study which incorporate ideas from different disciplines, the use of ICT-driven instructional aides helps the learners on providing integrated experiences, which may vary from, disciplines which make the end product of education more productive. Since students are expose to the real nature of those concept or body of knowledge they tend to analyses and synthesis those body of knowledge for the proper application in their daily lives (Torruam and Abur, 2013).

7. It Save Time and Reduce Verbalism or Repletion of Words

Emma & Ajayi (2006) asserts that "figurative speaking instructional materials enable the teacher to be in more than one place at a time and to address several issues at a time. For example, a video material could be on while the teacher moves around to explain to individuals students the subject contents in response to requests based on individual differences on problems. While the video material continues, providing details of the assignment the teacher also becomes part of the listening audience (Yusuf, 2005). It reduces verbalism or repetition of world by the teacher without knowing their meaning and also adds Varity in reinforcing verbal messages by providing a multi-media approach. Esu (2004) added that instructional materials are indispensable factor in

a teaching learning process. This is because or clearly words or verbalization has been found to be inadequate for effective teaching. ICT-driven instructional aids, frankly speaking reduce the level at which the teacher should strives himself in the process of talking rather he guide the process of the instructions. And as a result save his time in process of teaching.

8. It is Use to Improve Teaching Methods

The teachers of electrical installation and maintenance work, perfect not only their methods of teaching but also perfect contents and situations (activities) to be taught. With the use of instructional materials, the teacher is able to edit, try and retry, alter and delete his activities to fit the standard of the students and also to effectively address the curriculum objectives (Torruam and Abur, 2013). Instructional materials if properly utilize helps in giving direct contact with the realities of the learners both social and physical environments.

9. To Promote Closer Relations between the Community and School

The purpose of using ICT-driven instructional aides is for the students to internalize the situational issues happening around his totality, the students will be able to identify crucial issues and address these issues if properly inculcated with the use of instructional materials. (Chuba, 2000 in Torruam and Abur 2013) posited three importance's of teaching aids in class, as; Easing off teachers' teaching task, satisfying different children's learning patterns and In-building of special child's or learner's appeal by teaching aid manufactures, which help to motivate or captivate interests of the learner. Chuba, 2000 in Torruam and Abur, (2013) outlined the following points as the reasons why teachers must apply teaching aids in classrooms: teaching aids helps to concretize abstract issues and topics; they motivate pupils' interests in topic being discusses, they develop continuity of reasoning and coherence of thought which augurs well with the inter-interdisciplinary nature of other subjects, Teaching aids save time and as things presented are almost self-explanatory, energy is saved in too much talking and writing and they help to appeal to pupil interests and this is because, they tend to appeal to children's difficulties as well as take care of children's differences.

2.13. Guidelines and Requirement for the Use of Information and communication technology-Driven Instructional Aids

Use and utilization judges the value of information and communication technology-driven instructional aids, process or personnel by the degree they singly or collectively satisfy the derived instructional needs. The foresight instructional behavior controls, to a large extent, the means for achieving them. Instructional materials are not ends in themselves but means of attaining specific instructional functions. Teachers ability to effectively utilize the available media and this optimize the attainments of instructional situation varies with their level of utilization. However, once materials have been selected, careful preparation comes first by the user and other subsequent preparation. Anyanwu (2003) in Torruam and Abur, (2013 p.515) identify three ways by which the teacher should prepare for the use of ICT-driven instructional aids in classroom, these are as follows:

a. By previewing- before any ICT-driven instructional aids are brought to the class, the teacher has to have a first knowledge by using it her self before the class.

b. first knowledge- the teacher should have a full knowledge of the parts, names operational level of the intended ICT-driven instructional aids.

c. Actual presentation- this is the period the teacher operates and uses these materials in instructing the children.

The following however, are the basic guidelines and requirement for utilization and use of ICT-driven instructional aids:

1. Specification of objectives: clear objectives which are behaviorally stated are user ring guides in ICT-driven instructional aids using process they direct the sequence, methods, content and techniques of instructional in subject matter. They provide scientific basis of valid evaluation instruments construction and administration.

2. Maximal fit with instructional tasks: ICT-driven instructional aids must be appropriate to situationally determined and individually responsive.

3. Preparation and preview: for effectives and successful use of ICT-driven instructional aids for proper teaching-learning situation, the teacher must in advance prepare himself, the learners and the environment, the materials as a matter of must should be previewed by the teacher in order to follow its process of presentation sequentially.

4. Multi-dimensional presentation: proper and creative use of a variety of ICT-driven instructional aids at different level of lesson planning can be adequate in achieving various instructional objectives, reason because it will enrich variety of learners mind as they attain better goals more easily than with the use of a single medium.

5. Environmental situation: the environmental variables such as physical cultural and social in which the ICT-driven instructional aids are utilized for learning have significant effect on their effectiveness. Sound-motion films for instance with their attention-complexly properties can be successfully presented in less quiet environment

6. Measure for outcomes: ICT-driven instructional aids should be evaluated in terms of their suitability, practicability to the instructional objectives, appeal to the cost effectiveness, learner achievement level, consistency with content call for improvement in utilization techniques (Torruam and Abur, 2013 p.515-516).

2.14. Application of Information and Communication Technology in Designing Instructional Material in Electrical installation and maintenance work

For effective teaching and learning to take place, there must be utilization of instructional materials. Teachers (Material in Electrical installation and maintenance work) nowadays are expected to use technological knowledge, principles and materials in Electrical installation and maintenance work concepts.

Electronic conferencing programmes, the web, spreadsheets etc. can be adopted to support students learning and enhance critical thinking (Tella, 2007). Students at the secondary and primary level of education who are ICT inclined are likely to discover a lot of digital tools and resources as well as similarly unclaimed younger ones, all over the world with whom to share and develop their talents (Pedro, 2004 in Dankaro and Jude, 2012).

2.15. Information and communication Technology in Teaching – Learning

In this generation of large class size and greater number of working learners than before, information and Communication is making it possible for teaching and learning of concepts and principles of operations in Electrical installation and maintenance work to take place via electronic network which is "virtual classroom" that is, classroom without walls, where students have access to teaching and instructional material via electronically transmitted channels (Evoh, 2007).Available literature indicates that integrating ICTs in teaching and learning is generally positive, leading to radical shift from the traditional teacher directed/didactic approach to a more student – centered/constructivist approach (Lopez, 2003 in Bassey, Okodobo and Akpanumoh, 2009). Langlois (2001) in Bassey, Okodobo and Akpanumoh, (2009) in positions that ICTs in teaching is less expensive, enables lessons to be introduced speedily, provide consistent message, make possible working from any location anytime updating contents easily and quickly, increase learners' retention and management of large group of students. It is argued that ICTs increase the productivity of secondary school teachers; help teachers to be more effective and productive; increase teachers' interest in teaching; assist teachers in reorganizing and restructuring their lessons; increase teachers' emphasis on individualized instruction; provide teachers with the opportunity to experiment with emerging technologies thus providing multi-media presence in the classroom; and also provide teachers with increased opportunities to collaborate and network with colleagues (Yusuf, 2007).The competencies that teachers of information and communication technologies require for application in education are that: teachers should become competent to make personal use of ICTs; competent masters of a range of educational paradigms that make use of information and communication technologies; sufficiently competent to make use of ICTs as a tool for teaching; competent in mastering a range of assessment paradigms which make use of ICTs; competency in understanding the policy dimension of the use of information and communication technologies for teaching and learning (Kirschner & Davis, 2003). Yusuf (2007, p.47) argues that in using ICTs, teachers should be competent in the use of a variety of software, particularly, software's that have specific application in various disciplines.

2.16. Information and Communication Technologies in Students' Learning

The perceptions of effecting information and communication technology on students learning, Yusuf (2007) explains that the use of information and communication technologies enhance students' learning through its constructivist approach which improves the performance of students; makes possible the application of multiple technologies (video, computer, telecommunication, etc.) thereby linking theory with practice; valuable computer skills needed in the job market are provided to students; flexible learning is available and accessible thereby catering for students of different learning styles; opportunities for students to collaborate and communicate on projects is increased; and a repertoire of resources to enhance students' learning are provided.

2.17. Summary of Literature Review

This chapter, attempts were made to Defined electrical installation and maintenance work and the nature of electricity, the concepts of computer assisted learning and computer managed instruction were discussed. The general uses of computer as a tools, ICT and technology education, empirical studies on ICT facilities availability and utilization in instructional development, teachers and instructional applications of ICT were also discussed. The need for ICT application in Nigerian secondary schools and ICT in Nigerian secondary schools was clearly stated, ICT-Driven instructional aides was lighted and how ICT-Driven instructional aides can improve qualitative education in Nigerian secondary schools, and some of the guide and requirement for the use of ICT were also discussed. Lastly, application of ICT in designinginstructional materials in electrical installation and maintenance work and ICT in teaching-learning and ICT in students' learning were also discussed.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. 3.2. Introduction

This chapter explains the steps, procedure and instrument that were used in analyzing the collected data. Specifically, the following aspect of the study was discussed, design of the study, population of the study, sample and sampling techniques, instrumentation, validation of the instruments, method of data collection and data analysis.

3.3. Research Design

The survey research design was used to carry out the study. Survey research design is one in which group of people or items are studied by collecting and analyzing data from only a few people or items considered being representative of the entire group (Lawal and Adeyeye, 2006).

3.4. Area of the study

There are 8 technical colleges inYobe state; Only 4 colleges were selected for this study the study was carried out in Government approved technical colleges in two educational zones in Yobe state Nigeria namely: Government Technical college potiskum, Government Technical College Geidam, Government Technical College Damagum and Government Girl Technical college potiskum.

3.5. Population of the study

The populations of the study consist of all principals and teachers teaching electrical installation and maintenance work in govt. technical colleges of Yobe State, Nigeria.

3.6. Sample and Sampling Technique

Looking at the nature of the schools and teacher's population, the researcher has decided to use forty-four (44) sample size respondents in this study, which consist all teachers teaching electrical installation and maintenance work from four technical colleges and their principals selected for the study in two educational zone in Yobe state i.e. Ten (10) teachers and four (4) principal from each of the four technical colleges. A purposive sampling was used for the

selection of the colleges while random sampling was used for the selection of the participants. The table below shows the description.

Table3.1. Sampling area and number of samples

Description	Name of Area	sample	No of sample
Teachers/ principal	GSTC Potiskum	10 teachers, 1 principal	11
Teachers/principal	GGSTC Potiskum	10 teachers, 1 principal	11
Teachers/principal	GSTC Damagum	10 teachers, 1 principal	11
Teachers/principal	GSTC Geidam	10 teachers, 1 principal	11
Total			44

3.7. Research Instrument/ Data Collection

The instrument used for the study was check list and five-point scale questionnaire to gathered information about the opinions of teachers and principals (respondents). The check list and questionnaire for respondents consist of forty-seven (47) items. The respondents are instructed to tick with the key ($\sqrt{}$) in front of each item to indicate the extent of their agreement or disagreement with each item. The check list and questionnaire are structured into four parts, part A consist of check list about the Availability of ICT facilities, part B consist of check list about the functionality of ICT facilities, part C consist of check list about the utilization or usability of ICT facilities in teaching electrical installation and maintenance work and part D are questionnaires about the constraints to the effective utilization of ICT facilities in teaching electrical installation and maintenance work which are tabulated in four sections as shown in Appendix A. Questionnaires was sent to a colleague through Email who was assigned as research assistant and was administered directly by distributing them to the respondents in each four (4) Technical colleges in printed format (hardcopy) and feedback was sent to the researcher through WhatsApp which is one of the social media of sending and receiving information at the same time the questionnaire response was structured in five (5) point- scale and check list was structured in three (3) point scale as shown in table below.

29

Table3.2.for Check lists instrument

3.2.1 Three (3) point- scale for research question one

Modify scale		Points
Highly available	(HA)	3
Available	(A)	2
Not available	(NA)	1

3.2.2. Three (3) point- scale for research question two

Modify scale		Points
Functional	(F)	3
Low functional	(LF)	2
Not functional	(NF)	1

3.2.3. Three (3) point- scale for research question three

Modify scale		Points
Frequently used	(FU)	3
Occasionally used	(OU)	2
Not used	(NU)	1

For Questionnaire instrument

3.2.4. Five (5) point- scale for research question four

Modify Likert scale		Points
Strongly Agree	(SA)	5
Agree	(A)	4
Undecided	(U)	3
Disagree	(D)	2
Strongly Disagree	(SD)	1

Table3.3. Showing the calculated mean limits categories for 3 point-scale

NA = 1.00-1.49	NF =1.00-1.49	NU=1.00-1.49
A= 1.50-2.49	LF=1.50-2.49	OU=1.50-2.49
HA = 2.50-3.00	F=2.50-3.00	FU=2.50-3.00

Table3.4 showing the calculated mean limits categories for 5 point-scale

Strongly Disagree	SD	0.45-1.49
Disagree	D	1.50-2.49
Undecided	U	2.50-3.49
Agreed	A	3.50-4.49
Strongly Agreed	SA	4.50-5.00

3.8. Detailed Description of Questionnaires;

A total of forty-four (44) respondents were sampled and questionnaires were sent and distributed to them. A total of forty-four (44) (100%) questionnaires were returned with no missing questions i.e. unanswered questions and the total questionnaires returned as well as percentages of designation and gender stated were shown in tables below.

Table 3.5 showing descriptions of questionnaires

Statistics

		Name of School	Designation	Sex	Teachers qualification
N	Valid	44	44	44	44
	Missing	0	0	0	0

Name of School

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	GGSTC PKM	11	25.0	25.0	25.0
	GSTC DAMAGUM	11	25.0	25.0	50.0
	GSTC GEIDAM	11	25.0	25.0	75.0
	GSTC POT	11	25.0	25.0	100.0
	Total	44	100.0	100.0	

Designation

		Frequency	Percent	Valid Percent	Cumulative Percent
	Principal	4	9.1	9.1	9.1
Valid	Teacher	40	90.9	90.9	100.0
	Total	44	100.0	100.0	

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
	Male	37	84.1	84.1	84.1
Valid	Female	7	15.9	15.9	100.0
	Total	44	100.0	100.0	

Teachers qualification

		Frequency	Percent	Valid Percent	Cumulative Percent
	NCE	14	31.8	31.8	31.8
	B. Ed.	29	65.9	65.9	97.7
Valid	M.sc and Others	1	2.3	2.3	100.0
	Total	44	100.0	100.0	

Computer set

		Frequency	Percent	Valid Percent	Cumulative Percent
	NA	5	11.4	11.4	11.4
Valid	A	20	45.5	45.5	56.8
	HA	19	43.2	43.2	100.0
	Total	44	100.0	100.0	

Printer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NA	7	15.9	15.9	15.9
	A	29	65.9	65.9	81.8
	HA	8	18.2	18.2	100.0
	Total	44	100.0	100.0	

Scanner

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NA	18	40.9	40.9	40.9
	A	20	45.5	45.5	86.4
	HA	6	13.6	13.6	100.0
	Total	44	100.0	100.0	

Internet service

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NA	22	50.0	50.0	50.0
	A	17	38.6	38.6	88.6
	HA	5	11.4	11.4	100.0
	Total	44	100.0	100.0	

Projector

		Frequency	Percent	Valid Percent	Cumulative Percent
	NA	14	31.8	31.8	31.8
	A	18	40.9	40.9	72.7
Valid	HA	12	27.3	27.3	100.0
	Total	44	100.0	100.0	

Interactive white board

		Frequency	Percent	Valid Percent	Cumulative Percent
	NA	17	38.6	38.6	38.6
	A	16	36.4	36.4	75.0
Valid	HA	11	25.0	25.0	100.0
	Total	44	100.0	100.0	

Photocopier

		Frequency	Percent	Valid Percent	Cumulative Percent
	NA	19	43.2	43.2	43.2
	A	17	38.6	38.6	81.8
Valid	HA	8	18.2	18.2	100.0
	Total	44	100.0	100.0	

Television set

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NA	21	47.7	47.7	47.7
	A	17	38.6	38.6	86.4
	HA	6	13.6	13.6	100.0
	Total	44	100.0	100.0	

Smartphone

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NA	12	27.3	27.3	27.3
	A	16	36.4	36.4	63.6
	HA	16	36.4	36.4	100.0
	Total	44	100.0	100.0	

Laptop

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NA	8	18.2	18.2	18.2
	A	24	54.5	54.5	72.7
	HA	12	27.3	27.3	100.0
	Total	44	100.0	100.0	

Public addressing sys

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NA	26	59.1	59.1	59.1
	A	13	29.5	29.5	88.6
	HA	5	11.4	11.4	100.0
	Total	44	100.0	100.0	

Digital camera

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NA	28	63.6	63.6	63.6
	A	13	29.5	29.5	93.2
	HA	3	6.8	6.8	100.0
	Total	44	100.0	100.0	

The tables above show that the response rate was 100% of the targeted respondents the researcher felt that the views expressed in the report represented the target population.

3.9. Data Analysis

Data collected from the respondents through questionnaire were analyzed and tabulated in the form of the frequencies and percentages also each table tabulated were followed by its detailed interpretation.

Quantitative method of data analysis was used, where mean and standard deviation was analyzed using SPSS version 20 software in the analysis of data obtained.

3.10. Decision Rule

A mean score of 1.5 was chosen as a decision point, the score from 1.5 and above is accepted while score from 1.49 and below is not accepted for three point check list. A mean score of 2.5

was chosen as a decision point, the score from 2.5 and above is agreed, while score from 2.49 and below is disagreed for five point scale questionnaire.

3.11. Validation of the Instrument

The questionnaire for this study was validated by four lecturers. Two from the department of Technical and Vocational Education and Two from Computer Science Engineering department both from Islamic university of Technology (IUT). Their comment was used in modifying the test items or questionnaire.

3.12. Ethical Consideration

The selection process of the participants and their participation in this study will require the approval of the four (4) selected technical colleges from two educational zone of Yobe state, Nigeria. Each participant will be given a questionnaire and required time to fill the questionnaire voluntarily.

All the participants' information will be kept confidential and remains anonymous. Moreover, the study will ensure that all the data collected will use aliases. Participants did not have any influence and link with the aliases.

CHAPTER FOUR

ANALYSIS OF DATA

4.1 Introduction

This chapter consists of data analysis and presentation of the results. The data obtained from the respondents via questionnaire and check list were organized, presented and tabulated in forms of frequencies and percentages, also other table were prepared for different aspect of the checklist and questionnaires which are interpreted in line with the feedback received from the respondents using SPSS version 20 software.

4.2 Research Question One

What are the level of availability of information and communication technology (ICT) facilities in teaching electrical installation and maintenance work?

Table 4.1: showing the analysis of availability of ICT facilities in teaching electrical installation and maintenance work

S/N	FACILITIES	MEAN	SD	REMARK
1	Computer set	2.32	.674	Highly Available
2	Printer	2.02	.590	Highly Available
3	Scanner	1.73	.694	Available
4	Internet service	1.61	.689	Available
5	Projector	1.95	.776	Available
6	Interactive white board	1.86	.795	Available
7	Photocopier	1.75	.751	Available
8	Television set	1.66	.713	Available

9	Smartphone	2.09	.802	Highly Available
10	Laptop	2.09	.676	Highly Available
11	Public addressing sys	1.52	.698	Available
12	Digital camera	1.43	.625	Not Available
	Average mean	**1.84**	**0.71**	**Available**

The result in table 1 above showed that items 1, 2,9,10 with mean score of 2.32, 2.02, 2.09 and 2.09 respectively. The result shows that ICTs facilities are highly available while items 3,4,5,6,7,8,11 with mean score of 1.73,1.61,1.95,1.86,1.75,1.66 and 1.52. The result indicates that the items are available but in a low quantity and item 12 with mean score of 1.43 shows that the item is not available for teaching electrical installation and maintenance work subjects Which may be due to the availabilities of Smartphone that are known taken the places of cameras which can perform almost all functions of the digital camera and even better. Hence, the grand mean average 1.84 suggest that the availability of ICTs facilities is adequate in most of the schools for teaching electrical installation and maintenance work and the pull standard deviation 0.71 also agree that the facilities are available in most of the schools.

4.3. Research Question Two

What are the levels of functionality of information and communication technology (ICT) facilities for teaching electrical installation and maintenance work?

Table4.2: showing the analysis of the level of functionality of ICTs facilities in teaching electrical installation and maintenance work

S/N	FACILITIES	MEAN	SD	REMARK
1	Computer set	2.61	.618	functional
2	Printer	2.55	.663	functional

3	Scanner	1.98	.849	Low functional
4	Internet service	1.64	.750	Low functional
5	Projector	2.14	.878	functional
6	Interactive white board	1.95	.914	Low functional
7	Photocopier	1.95	.776	Low functional
8	Television set	1.77	.803	Low functional
9	Smartphone	2.16	.888	functional
10	Laptop	2.25	.751	functional
11	Public addressing sys	1.59	.757	Low functional
12	Digital camera	1.57	.789	Not functional
	Average mean	**2.01**	**0.85**	**functional**

The result in table 2 above show that item 1, 2, 5, 9, and 10 with mean score of 2.61, 2.55, 2.14, 2.16 and 2.25 respectively. The result indicate that the respondents show that ICTs facilities are functional while item 3, 4, 6,7,8,11,12 with mean score of 1.98, 1.64, 1.95, 1.95, 1.77, 1.59 and 1.57 which indicate that the items are low functional for teaching electrical installation and maintenance work subjects. However the grand mean average of 2.01 suggests that ICTs facilities are functional for teaching the trade subject (EIAMW) and the pull standard deviation of 0.85 shows that facilities are functional.

4.4. Research Question three;

What are the extent of information and communication technology (ICT) facilities utilization in teaching electrical installation and maintenance work?

Table4.3; showing extent of information and communication technology (ICT) facilities utilization in teaching electrical installation and maintenance work

S/N	Facilities	Mean	SD	Remark
1	Computer set	2.55	.663	Frequently Used
2	Printer	2.52	.664	Frequently Used
3	Scanner	1.86	.795	Occasionally Used
4	Internet service	1.80	.795	Occasionally Used
5	Projector	2.02	.876	Frequently Used
6	Interactive white board	2.05	.914	Frequently Used
7	Photocopier	1.84	.776	Occasionally Used
8	Television set	1.82	.815	Occasionally Used
9	Smartphone	2.11	.945	Frequently Used
10	Laptop	2.27	.758	Frequently Used
11	Public addressing sys	1.59	.726	Occasionally Used
12	Digital camera	1.50	.762	Occasionally Used
	Average mean	**1.99**	**0.790**	**Frequently Used**

Table 3 above, presents mean score and standard deviation of research question three. Where by item 1,2,5,6,9,10 have the calculated mean score of 2.55, 2.52, 2.02, 2.05, 2.11and 2.27 respectively. These indicate that respondent show the facilities are frequently used. While item 3, 4,7,8,11,12 with the calculated mean score of 1.86, 1.80, 1.84, 1.82, 1.59 and 1.50 are occasionally used for teaching electrical installation and maintenance work in senior technical colleges. However, the grand mean average 1.99 shows that the ICTs facilities are frequently utilized for the purpose of teaching and the pull standard deviation 0.790 also show that there is

concord in the utilization of ICTs facilities in teaching electrical installation and maintenance work subject in technical colleges.

4.5. Research Question Four:

What are the constraints to the effective utilization, of information and communication technology (ICT) facilities in teaching electrical installation and maintenance work?

Table 4.4; showing the constraints to the effective utilization, of information and communication technology (ICT) facilities in teaching electrical installation and maintenance work

S/N	Facilities	Mean	SD	Remark
1	Intermittent disruption of electricity	3.16	1.328	Agreed
2	Lack of technical support staff	3.02	1.372	Agreed
3	Poor internet connectivity	3.41	1.499	Agreed
4	Using ICT facilities makes preparation of lesson more time demanding	1.50	1.110	Disagreed
5	Poor working condition of computers	2.59	1.317	Agreed
6	Poor power backup supply that damage the ICT facilities	2.61	1.243	Agreed
7	Computers with low configuration requirement	2.66	1.180	Agreed
8	Inadequate funding to provide ICT facilities	3.57	1.354	Agreed
9	Lack of simulation application e.g. electrical computer aided design (CAD) software	4.02	.849	Agreed
10	Lack of appreciation for wiring diagram e.g. Visio	3.66	1.077	Agreed
11	Providers provides ICT facilities not based on	3.09	1.117	Agreed

users need			
Average mean	**3.03**	**1.221**	**Agreed**

Table 4 above shows the mean score of research question four. Item 1,2,3,5,6,7,8,9,10 and 11 have mean score of 3.16, 3.02, 3.41, 1.50, 2.59, 2.61, 2.66, 3.57, 4.02, 3.66 and 3.09which indicate that the respondents agreed to the constraints to the effective utilization of ICTs facilities in teaching and item 4 with mean score of 1.50 disagreed which show that preparation of lesson using ICTs facilities is not time demanding rather it make preparation easy. Hence the grand mean average 3.03 suggest that teachers are facing a lot of difficulties for affective utilization of ICTs facilities in teaching electrical installation and maintenance work.

4.6. Summary

The result obtained from research question1, 2, 3 and 4 where clearly presented in the above table 1, 2, 3, and 4. The research question 1 shows that information and communication technology facilities are available in low quantity because only computer, printer, Smartphone and laptop are available in most of the schools while internet services are not available and other items are available in a very low quantity for teaching purpose. Research question 2 shows that information and communication technology facilities are functional while some are low functional for teaching process. Research question 3 also shows vividly that the available information and communication technology facilities are frequently used while others are occasionally used for teaching purpose.

Finally, research question 4 shows that almost all teachers agreed to the constraints to the effective utilization of information and communication technology facilities in teaching electrical installation and maintenance work and also disagreed with the item thatUsing ICT facilities makes preparation of lesson more time demanding.

CHAPTER FIVE

Discussion, Conclusion and Recommendation

5.1. Introduction

The chapter would discuses under the following subheadings: Summary, Discussion of Finding, Conclusion and Limitation of the Study, Recommendation and Suggestion for Further Study

5.2. Summary

The research work was designed to assess availability; functionality and utilization of ICT facilities for teaching electrical installation and maintenance work in government technical college of Yobe State. Related literatures were used to guide the study and the purpose of the study is to examine the level of availability, functionality and utilization of ICT facilities for teaching electrical installation and maintenance work

Survey research designed was carried out for the studies of gathering data in a quantitative form. And the research comprises of forty (40) electrical installation and maintenance work teachers and four (4) principals of government technical college of Yobe State where used as the respondents making total of forty four (44) samples. Four government technical colleges was purposively selected to represent the entire technical college of Yobe state and the teachers teaching electrical installation and maintenance work in the schools. Mean and standard deviation were the statistical tools used for the analysis using SPSS version 20 software to analyzed the data and result of the finding were obtained. Discussion of the finding followed based on the result obtained from the analysis.

5.3. Discussion of the Findings

The findings of this study were discussed in line with the research questions formulated. The foregoing shows the analysis of data collected for this study. It was reviewed that many schools in Yobe state are deficient in the availability of information and communication technology facilities. Most of these schools have enough computers, printers, Smartphone and laptops. Almost all the schools did not have enough scanner, internet services, projectors interactive white board, photocopier, television, and public addressing system while digital camera is not

available in most of the schools. Schools with computers don't have the relevant educational software required by their students. In addition, the computers available in these schools cannot meet the need of the large population of students in these schools. Some schools with internet connectivity have been cut off because they have not been able to pay the access fees. This is an indication that ICT facilities are not vigorously provided for the schools and it suggest that, the state is not fully ready to imbibe information and communication technology, the finding was consistent with the finding of (Umoren, 2006 and Ezeoba, 2007) which indicated that information and communication technology facilities for effective teaching and learning are deficient in schools. The finding also agreed with those of other researchers (Fakeye, 2010 and Idoko and Ademu, 2010) all of which revealed that facilities for effective teaching and learning are deficient in Nigeria secondary schools.

The findings of the second research question indicates that the respondents shows that some ICT facilities are functional, while some are low functional in teaching electrical installation and maintenance work in Yobe state.

The findings of the third research question indicate a low level usage of ICT facilities which might have been connected with the shortage of such facilities in the schools. This is an evidence from the findings indicating that ICT facilities such as computer for typing, processing and presentation of lesson, printer for printing of documents, projectors, interactive white board for projecting/presentations of lesson, Smartphone and laptop are frequently used, while scanner, internet service which provide access to the world wide web/connectivity for getting new information, photocopier, television for visual of educational programmes, public addressing system for voice amplification and digital camera were occasionally used in most of the schools. The findings therefore suggest that, the use of ICT facilities in the schools was low, which is in line with the findings made by (Ezeoba, 2007) and (Fakeye, 2010) which revealed a low level usage of ICT facilities in technical colleges.

The findings of the fourth research question indicated that the respondents agreed that the most notable constraints to the effective utilization of ICT facilities in teaching and learning electrical installation and maintenance work in Yobe state technical colleges were the intermittent disruption of electricity supply, Lack of technical support staff, Poor internet connectivity, Poor working condition of computers, Poor power backup supply that damage the ICT facilities,

Computers with low configuration requirement, Inadequate funding to provide ICT facilities, Lack of simulation application e.g. electrical computer aided design (CAD) software, Lack of appreciation for wiring diagram e.g. visio and Providers provides ICT facilities not based on users need. The findings was consistent with the findings made by (Torruam and Abur, 2013) all of which indicated that these among the constraints to the effective utilization of ICT facilities in Nigerian technical colleges. Also the respondent disagreed with the constraints to the effective use of ICT facilities in teaching, that Using ICT facilities make preparation of lesson more time demanding. Therefore, this is evidence in the findings of these studies which indicate a low level provision of ICT facilities for teaching electrical installation and maintenance work in technical colleges. The findings have led the researcher to conclude that the provision of ICT facilities is significantly related to effective teaching of electrical installation and maintenance work. It was therefore, concluded that ICT facilities such as computers, printers, Smartphone and laptop are highly available, while some facilities are available some not available, facilities such as computer sets, printers, projectors, Smartphone, and laptop are functional while some are low functional. And also some ICT facilities are frequently used and some occasionally used. And lastly, lack of simulation application software, poor internet connectivity and funding are the major problems inhibiting the usage of ICTs facilities for effective teaching and learning of electrical installation and maintenance work in Yobe state technical colleges of Nigeria.

5.4. Conclusion

 The purpose of this study was to find out whether there are adequate ICTs facilities for teaching electrical installation and maintenance work and to ascertain how effective are the ICTs facilities are utilized in teaching electrical installation and maintenance work in technical colleges of Yobe state. It was as well as the purpose of this study that the findings of the research shall be used to suggest the possible solution to the Yobe State government where ICT facilities are not available, inadequate, and where available but are not properly and effectively utilized in teaching electrical installation and maintenance work in Yobe State. The government from review of literature on the use of ICT for teaching electrical installation and maintenance work places high value on these issues of the use of ICTs in teaching electrical installation and maintenance work. Among the major short falls observed from the investigation of the schools. It was discovered that there are schools where the ICT facilities are not highly available and

those available are not adequate some are functional, while some are low functional and the teachers are not able to effectively utilize these facilities in teaching electrical installation and maintenance work based on the constraint which is affecting the use of these facilities in the schools. It is therefore hoped that, the government in the state as well as educational body/planners and other institutions/researchers place more efforts to find out the necessary implementation problems of ICT facilities utilization for the teaching of electrical installation and maintenance work subject as well as to resolve such problems. The government should show enough interest and ways of providing a lasting solution to the inadequate, functionality, lack of ICT facilities and constraints in utilization of ICT facilities for teaching electrical installation and maintenance work, enumerate as the findings and utilization of the findings on ICT for the growth, progress of ICTs and the utilization of these facilities for teaching electrical installation and maintenance work.

5.5. Limitation of the Study

The major limitation of this study was time allocated for the research work, financial instability, difficulties in filling the entire research instrument as all the electrical installation and maintenance work teachers are required to fill it and lack of enough literatures on the topic to mention but few.

5.6. Recommendation

In order to ensure that information and communication technology facilities are widely adopted and used in secondary schools system, the following recommendations are made:

1. Government and private organizations should partner with government in provision of adequate ICT facilities to schools and to ensure adequate electricity supply in schools and internet services.

2. institutions and ministry of education should mount periodic training sessions (workshops/seminars) for teachers on the use of ICT facilities and encourage the teachers to use them in teaching process.

3. Schools should appeals to non-governmental organizations, private sectors, individuals and industries to assists in supplementing and substituting obsolete ICT facilities like

computers, projectors and other software packages with latest tones and trains manpower for their maintenance.

4. Supervisors and inspectors from ministry of education/teaching service boards should be sent to the schools to ascertain the degree of availability, functionality and utilization of the ICT facilities and ICT provided by the government and other private organization.

5.7. Suggestion for Further Study

The researcher suggests that, further research work could be carried out in relation to the topic exploited based on:

1. Investigation into the implementation problems of ICT facilities for teaching and learning electrical installation and maintenance work should be carried out by others.

2. Perception of electrical installation and maintenance work teachers on utilization of ICT facilities in teaching and learning should be carried out too.

3. Impact of ICTs in teaching electrical installation and maintenance work over the conventional method of teaching.

Bibliography

Adegbemile, O. (2004). *Perspectives, impacts and goals of IT as a source of development for the young people of Africa: Nigeria as a case study.* ESL CONTEXT: http://www.ayf.deldocuments/Cynthi.doc.

Adeyemi, T.O. and Olaleye, F.O. (2012). *Information Communication and Technology (ICT) for the Effective Management of Secondary Schools for Sustainable Development in Ekiti State,Nigeria.* American-Eurasian Journal of Scientific Research 5 (2): 106-113, ISSN 1818-6785 IDOSI Publications.

Adomi, E.E. (2006). *Mobile phone usage patterns of library and information science students at Delta State University, Abraka, Nigeria.* Electronic Journal of Academic and Special Librarianship 7 (1). Available: http://southernlibrarianship.icaap.org/v7n01/adomi-e01.htm.

Adomi, E.E., &Anie, S.O. (2006). *An assessment of computer literacy skills of professionals in Nigerian university libraries.* Library Hi Tech News 23 (2): 10-14.

Aduwa-Ogiegbean, S.E., &Iyamu, E.O.S. (2005). *Using information and communication technology in secondary schools in Nigeria.* Educational Technology & Society 8 (1),104-112.

Ajayi, I.A. (2008). *Towards effective use of information and communication technology for teaching in nigerian colleges of education.* Asian J. Inf. Technol. 7(5): 210- 214.

Amuchie A.A (2015) in Nomsa M. (2018), availability, community of practice and relative Advantange of ICT resources utilization in teaching-learning secondary school agriculture.

Bandele, S.O. (2006). *Development of modern ICT and internet system. In Agagu AA (ed).*

Information and communication technology and computer Applications. Abuja: Panof Press pp. 1–3.

Bassey, S.U., Okodobo, D. and Akpanumoh, U.D. (2009).*Information Communication Technologies in the Management of Education for Sustainable Development in Africa.* International Multi-Disciplinary Journal, Ethiopia 3 (3), ISSN 2070-0083 (Online).

Bird, S. and Jones, T. (2007).*Electrical and Electronic Principles and Technology* (3rd ed.), Newnes, ISBN 0-978-8556-6.

Butterfield .S. (2000) Technical and vocational education through open learning trend development and issues from a local perspective. A publication of open polytechnics, new Zealand

Busstra, J.J. (2002) ICTs and their relative impact on the organization and content of vocational Training UNESCO Expert meeting on Information and Communication Technologiesi in and Vocational Education and Training. Moscow: UNESCO IITE.

CEO Forum on Education Technology (2005). *School technology and readiness report: Key building blocks for student achievement in the 21st century: integrating digital content.* Washington, DC: Author. Available at: http://www.ceoforum.org/downloads/report4.pdf Cox

Chijioke J.O (2016) Prospects of VET: toward addressing youth unemployment in Nigeria. Unevoc.unesco.org

Dankaro, W.I. and Jude, J.T. (2012). *ICT Resource Utilization, Availability and Accessibility by Teacher Educators for Instructional Development in College of Education katsina-* Ala. New Media and Mass Communication.3(1). ISSN 2224-3275 (Online).

Ekwe E.E (2009) challenge of vocational education in the present day nigria

Ementa C.N (2013), curriculum implementation of entrepreneurial subject at the senior

secondary school. A case for entrepreneurship education at senior secondary school in Nigeria. Unizik, orient journals of education 7 (1) 104-111.

Emma, E. & Ajayi, D. T. (2006). *Educational Technology: Methods, Materials, Machines. Jos:* Jos   University Press Ltd.

Esu, J.O. (2004). Role *of information and communication technology in globalization.* In Agagu AA (ed). Information and Community Technology and computer applications. Abuja: Pan of   Press pp. 68 – 76.

Evoh, C.J. (2007). *Policy networks and the transformation of secondary education Through ICTs in Africa:* The prospects and challenges of the NEPAD E-schools Initiative. International Journal of Education and Development Using Information and Communication Technology(IJEDICT)   3   (1),   64-84.Available:http://ijedict.dec.uwi.edu/include/getdoc.php?id=2198&article=272&mode= pdf

Ezeoba, K. O. (2007). *Instructional Media. An Assessment of the Availability, Utilization and Production by Nursery School Teachers.* Journal of Applied Literacy and Reading. 3 (Special   Edition) 33-38.

Fakeye,D.(2010).AssessmentofEnglishlanguageTeachers'KnowledgeanduseofInformation CommunicationTechnology(ICT)inIbadanSouthwestLocalGovernmentofOyoState. American Marcelle,EurasianJournalofScientificResearch5(4);270

Federal Republic of Nigeria (2004). *National policy on education. 4th ed.* Lagos: Nigerian Educational Research and Development Council.

Federal Republic of Nigeria (2006). *Government in action.* Available:

http://www.nigeriafirst.org/article_2090.shtml.

Federal republic of Nigeria (FRN, 2013) national policy on education lagos NEDRC press pg8.

Federal republic of Nigeria (2014) National Policy on education, Lagos NERDC press.

Goshit, T. (2006). *Nigeria's need for ICT: SP. 259 technology and policy in Africa.* Available:

   http://ocw.mit.edu/NR/rdonlyres/Special-Programs/SP-259Spring-2006/891209EE-
   E63B-4617-BA9D-7635A63C754B/0/goshit.pdf.

FRN (2008), national policy on education (5th edition) Lagos NERDC press

IAC Publishing & LLC (2016) what is purposive sampling technique,

   https://www.reference.com/world-view/purposive-samplintechni4e62f97124026bbb#,
   © 2016 IAC Publishing, LLC.

Idoko, J. A. and Ademu, A. (2010). The Challenges of Information and Communication
   Technology for Teaching –Learning as perceived by Agricultural Science Teachers in
   Secondary Schools in Kogi State. Journal of Educational Innovators. 3 (2).43-49

Ikenga, G.U., Akiti,N.&Onyemah, L.N.(2009). *Computer aided instruction (CAI). Strategies in*

   the teaching and learning of business education intertiary institutions. A paper presented
   at the21st annual national conference of the association of business educators of Nigeria
   (ABEN) on the 13th-17th October, 2009 at Abia State polytechnic, Aba, Abia State.

Ikwuka,O.I. (2012). Development and Use of Computer Assisted Instructional Package

   on secondary School Students' Academic Achievement in English
   Language.*InternationalJournal of Education Science and Public Policy in Africa
   (IJESPPA), 2*(1), 136-140. www.ijesppaonIine.wordpress.com.

Imam, H. (2005). *A comparative study of teacher-pupil ratio in public and private primary*

   schools in Nigeria. Nigeria Journal of Educational Administration and Planning, 5(2),
   124 – 128.

Jimoh, A.T. (2007). *Students' attitude toward ICT in Nigeria tertiary institutions.* Educ. Focus ,

   1(1): 73 – 79.

John, D.A. (2007). *Electrical engineering: the backbone of society",* Proceedings of the IEE:

Science, Measurement and Technology 138 (1): 1–10.

Kamba, M. A., (2009). *Problems, Challenges and Benefits of Implementing E-learning in Nigerian Universities:* An Empirical Study. International Journal of Emerging Technologies in   Learning. The Punch Newspaper (2012) 11th July.

Kirschner, P., and Davis, N. E. (2003). *Pedagogic benchmarks for ICT in teacher education (Electronic version).* Technology Pedagogy and Education, 12(1).

Kwache, P.Z. (2007). *The imperatives of information and communication technology for teachers in Nigeria higher education.* MERLOT Journal of Online learning and teaching. 3(4):   359 – 399.

Lawal, A. and Adeyeye, O. (2006). *Essentials of Research Methodology,* Olas venture, Nigeria.

Lei, J. and Zhao, O. (2006). *Technology uses and student achievement:* A longitudinal study. Computers and Education. Available at: http://www.sciencedirect.com

National Business and Technical Examination Boards (2006). *Syllabus uses (2006-2007) E.T.F. Intervention In TVET.* New South Wales Consolidated Acts (2004), Electricity (Consumer   Safety)   Act   2004-SECT   3   available   at: http://www.austllii.edu.au/au/legis/nsw/conso/act/esa2004/s3.html.

NBTE (2004), curriculum for technical colleges Kaduna NBTE press, Ngwoke B.K (2006). education for youth empowerment Enugu. Africa marketing development foundation.

Nwafor, S. O. (2005). *Information Technology: A modern tool for the administration of universities in Rivers State.* Nigerian Journal of Educational Administration and Planning,   5.(2), 184-188.

Nwite, O. (2007). *Utilization of information and communication technology in schools: problem and suggestions.* In Babalola JB, Akpa GO, Ayeni AO, Adedeji SO (eds) Access, equity and quality in higher education. National Association for Educational

Administration and Planning (NAEAP) Publications. Ibadan: Awemark Printers pp. 487-496.

Nzewi, U. (2009). *Information and Communication Technology (ICT) in Teaching and Learning. Curriculum and Practice.* Curriculum Organization of Nigeria.

Ofodu, G.O. (2007). *Nigeria Literary educators and their technological needs in a digital age.* Educ. Focus 1(1): 22 – 30.

Ogunsola, L.A. (2005). *Information communication technologies and the effects of globalization: Twenty-first century "digital slavery" for developing countries- Myth or Reality?* Electronic Journal of Academic and Special Librarianship 6 (1- 2) 1-10.

Okah, I.R. (2012). *Information and Communication Technology for UBE Implementation in Nigeria:* An Imperative for Achieving Sustainable Millennium Development Goals: Journal of Resourcefulness and Distinction, 1. (1). 101-111.

Okoli, E. C. (2007). *The place of the improved ICTs in the management of Nigerian University education.* In J. B. Babalola, G. O. Akpa, A. O. Ayeni & S. O. Adedeji (Eds.) Access, Equity and   Quality in Higher Education. Ibadan: NAEAP Publications, 523-532.

Okoro, O. M. (2006) *Principles and Methods in Vocational and Technical Education,* Nsukka: University Trust Publishers

Okoye, K.R.E and Okwelle, P.C. (2014). Technical Vocational Education and Training (TVET) Intervention mechanism for global competitiveness: perspectives from Nigeria: Developing Country Studies, 4(4), 85-91

Olorunsola, E.O. (2007). *Information Communication Technology. A tool for effective management in Nigerian universities.* Educ. Focus 1(1): 80 – 87.

Onoh B.C.C and Onyebuenyi P.N (2016), electrical installation and maintenance skill need of

Technical colleges graduate for job creation and self-reliance in education.

Onwuagboke B.B.C and Sighn (2014), availability, gender and determinate of ICT utilization in Teaching in rural secondary schools in south eastern Nigeria, the international journal of Science and technology vol.2 issue 5pp.410-416

Prensky, M. (2005). *What can you learn a cell phone?* Almost anything! Innovative: Journal of Online Education, 1 (5).

Robert-Okah, I. (2009). *The role of ICT in university administration in Nigeria.* Academic Scholarship Journal 2(2), 91-106.

Tella, A. (2007). *Impact of web-based e-learning at the University of Botswana.* The African Symposium: An on-line Journal of African Educational Research Network, 7(2), 87-97 (ISSN#TX 6-342-323).

Tella, A. Toyobo, O.M. and Adika, O. (2010). *An Assessment of Secondary School Teachers Uses of ICT'S: Implications for Further Developmemt of ICT'S Use in Nigerian secondary Schools.* International Education Journal 9 (1) 122-137.

Torruam, J.T. and Abur, C.C. (2013).*The Impact of ICT-Driven Instructional Aids in Nigerian Secondary Schools. International Journal of Basic and Applied Science.*1(3),InsanAkademikapublication. pp. 511-518. http://www.insikapub.com/Vol-01/No-03/06IJBAS(1)(3).pdf&sa=U&ei=U_eYUtiLMXcoASxrIGADA&ved=0CB4QFjAF&usg=AFQjCNHtheuI-7HoIkAwPcx39B4ajJ5OwA

Umoren, G. (2006). Information and Communication Technology and Curriculum. Nigerian Journal of Curriculum Studies. Calabar Chapter. 2 (1), 57-83

UNDP. (2006). *Information communication technologies and development.* Available at: http://usdnhq.undp.prg/it4dev/ {Accessed 26 July 2017}.

Yusuf, M.O. (2005). *Information and communication education: Analyzing the Nigerian national policy for information technology.* International Education Journal 6 (3), 316-321.

Zhang, Y. (2005).*Development and validation of an Internet use attitude scale. Computers and Education.* Available at: http://www.sciencedirect.com/science {Accessed 10 February 2017}.

APPENDIX

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

Department of Technical and Vocational Education (TVE)

Board Bazar Gazipur 1704, Bangladesh.

RESEARCH QUESTIONNAIRE

Dear Respondent,

REQUEST FOR COMPLETION OF A CHECKLIST AND QUESTIONNAIRE INSTRUMENT

I am a final year student of Master of Science in Technical Education (Electrical and Electronics Engineering) from the above mentioned institution, conducting research on the topic: **"Assessment of ICTs Facilities In Teaching and Learning Electrical Installation and Maintenance Work in Government Technical College of Yobe state"**.

You have been selected as the major stake holder for participation in this study. I solicit your cooperation in providing information that will assist me in achieving the objectives of the study. Finally, your identity will not be disclosed and the information you provide will be taken confidentially.

Yours faithfully

Muhammed Adamu Yusuf

161031206

CHECKLIST AND QUESTIONNAIRE FOR PRINCIPAL

SECTION A

Personal Data

1. Name of your school…………………………………………..
2. Sex: male (   ) Female (   )
3. Teaching qualification: OND (   ) NCE (   ) B.ed (   ) M.sc and Others (   )
4. Teaching experience: 1 – 5 years (   ) 6-10 years (   ) 11 years and above (   )

SECTION B

Instruction: please tick (√) the appropriate option based on the following keys;

Highly Available   -   **HA**(anytime when in need of it)

Available   -   **A**(it is available only on demand/ priority)

Not Available   -   **NA**

Research Question One

What is the level of availability of information and communication technology (ICT) facilities for teaching electrical installation and maintenance work in your school?

S/N	Facilities	HA	A	NA
1	Computer sets			
2	Printer			
3	Scanning machine			
4	Internet service			
5	Projector			
6	Interactive White board			
7	Photocopying machine			
8	Television set / DVDs/ flash pen drive			
9	Smart phone			
10	Laptops			
11	Public addressing system			
12	Digital camera			

CHECKLIST AND QUESTIONNAIRE FOR TEACHERS

SECTION A

Personal Data

5. Name of your school…………………………………………..
6. Sex: male (   ) Female (   )
7. Teaching qualification: OND (   ) NCE (   ) B.ed (   ) M.sc and Others (   )
8. Teaching experience: 1 – 5 years (   ) 6-10 years (   ) 11 years and above (   )

SECTION B

Instruction: please tick (√) the appropriate option based on the following keys;

Highly Available   -   **HA**(anytime when in need of it)

Available   -   **A**(it is available only on demand/ priority)

Not Available   -   **NA**

Research Question One

What is the level of availability of information and communication technology (ICT) facilities for teaching electrical installation and maintenance work in your school?

S/N	Facilities	HA	A	NA
1	Computer sets			
2	Printer			
3	Scanning machine			
4	Internet service			
5	Projector			
6	Interactive White board			
7	Photocopying machine			
8	Television set / DVDs/ flash pen drive			
9	Smart phone			
10	Laptops			
11	Public addressing system			
12	Digital camera			

Instruction: please tick (√) the appropriate option based on the following keys;

Functional   -   **F**   (in good working condition)

Low Functional -   **LF** (not always in good working condition)

Not Functional -   **NF**   (not working at all)

Research Question Two

What are the levels of functionality of information and communication technology (ICT) facilities for teaching electrical installation and maintenance work in your school?

S/N	Facilities	F	LF	NF
1	Computer sets			
2	Printer			
3	Scanning machine			
4	Internet service			
5	Projector			
6	Interactive White board			
7	Photocopying machine			
8	Television set / DVDs/ flash pen drive			
9	Smart phone			
10	Laptops			
11	Public addressing system			
12	Digital camera			

Instruction: please tick (√) the appropriate option based on the following keys;

Frequently Used   -   **FU**   (day to day uses)

Occasionally Used   -   **OU**   (weekly/ monthly)

Not Used   -   **NU**   (at all)

Research Question Three

What are the extent of information and communication technology (ICT) facilities utilization in teaching electrical installation and maintenance work in your school?

S/N	ITEMS	FU	OU	NU
1	Computer sets			
2	Printer			
3	Scanning machine			
4	Internet service			
5	projector			
6	Interactive White board			
7	Photocopying machine			
8	Television set/DVDs/ flash pen drive			
9	Smart phone			
10	Laptops			
11	Public addressing system			
12	Digital camera			

Instruction: please tick (√) the appropriate option based on the following keys:

Strongly Agreed — **SA**

Agreed — **A**

Undecided — **U**

Disagreed — **D**

Strongly Disagreed — **SD**

Research Question Four

What are the constraints to the effective utilization, of information and communication technology (ICT) facilities in teaching electrical installation and maintenance work in your school?

S/N	Facilities	SA	A	U	D	SD
1	Intermittent disruption of electricity					
2	Lack of technical support staff					
3	Poor internet connectivity					
4	Using ICT facilities makes preparation of lesson more time demanding					
5	Poor working condition of computers					
6	Poor power backup supply that damage the ICT facilities					
7	Computers with low configuration requirement					
8	Inadequate funding to provide ICT facilities					
9	Lack of simulation application e.g electrical computer aided design (CAD) software					
10	Lack of appreciation for wiring diagram e.gvisio					
11	Providers provides ICT facilities not based on users need					