

**ASSESSMENT OF THE IMPLEMENTATION OF COMPUTER SCIENCE
EDUCATION IN COLLEGES OF EDUCATION IN KANO AND JIGAWA STATES,
NIGERIA**

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**DEPARTMENT OF EDUCATIONAL FOUNDATIONS AND CURRICULUM,
AHMADU BELLO UNIVERSITY
ZARIA**

DECEMBER, 2016

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**A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES,
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FACULTY OF EDUCATION,
AHMADU BELLO UNIVERSITY,
ZARIA, NIGERIA**

DECEMBER, 2016

DECLARATION

The research is hereby declared that this study entitled “ASSESSMENT OF THE IMPLEMENTATION OF COMPUTER SCIENCE EDUCATION IN COLLEGES OF EDUCATION IN KANO AND JIGAWA STATES, NIGERIA” has been carried by me in Department of Educational Foundations and Curriculum under the supervision of Dr. GarbaSa’ad and Dr. AliyuA.Dada The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this thesis was previously presented for another degree at any university.

.....
Idris ISYAKU

.....
Date

CERTIFICATION

This thesis titled “ASSESSMENT OF THE IMPLEMENTATION OF COMPUTER SCIENCE EDUCATION IN COLLEGES OF EDUCATION IN KANO AND JIGAWA STATES, NIGERIA” by Idris ISYAKU meets the regulations governing the award of the degree of master of Curriculum and Instruction of Ahmadu Bello University and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This research work is dedicated to beloved father Alhaji Isyaku, Saleh, and Mother MalamaRukkayyatuIsyaku and beloved wife ShemauIdris and my children Usman, Said, IshaqAmina and Muhammad. May Almighty God reward them abundantly.

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ABSTRACT

The study assessed the implementation of computer science education in colleges of education in Kano and Jigawa States, Nigeria. The research problem of this study was as a result of student's poor performance in computer education. Four objectives were formulated which are: to examine the extent to which laboratory facilities and equipment are adequately provide for the implementation of Computer Science Education (CSE) in College of Education in Kano and Jigawa States, determine the adequacy of the provision of manpower for the implementation of Computer Science Education (CSE) in College of Education in Kano and Jigawa State, ascertain whether there are adequate funds to implement Computer Science Education (CSE) in Kano and Jigawa States and find out the methodological approaches adopted for the implementation of Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa States. Research questions and hypotheses were in line with these objectives. This study used descriptive survey design. The population for this study was one thousand five hundred and sixty-eight (1,568) and the sample of three hundred and six (306) was purposively selected. A self-developed questionnaire was designed based on four Point-Likert modified rating scale. The instrument was pilot tested and found reliable for the study with 0.799 reliability index. Frequency counts and chi-square statistical tools were used in analyzing the data. The first hypothesis was retained while the remaining three were rejected. The findings indicated that there was inadequate provision of facilities and equipment for the implementation of Computer Science Education (CSE) in the study area, there was inadequate manpower and funds for the implementation of Computer Science Education (CSE) as well as inappropriate use of teaching methodologies. Finally the research recommended the following among others; the stakeholders of education in collaboration with other agencies and non-governmental organization should come to the aid of computer education by procuring adequate facilities and equipment in these states (Kano & Jigawa). Kano and Jigawa States government should consider the possibilities of establishing the educational trust fund similar to that of TETFUND at States level to support computer education in their colleges of education. This will intensify the government effort towards the financing of tertiary education across the states.

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LIST OF ABBREVIATIONS

ALU –	Arithmetic and Logic Units
CAI –	Computer Assisted Instruction
CBE –	Computer –Based Education
CEC-	Computer Education Curriculum
CESS –	Computer Education for Secondary Schools
CMI –	Computer Manage Instruction
CPU –	Central Processing Unit
CSL –	Computer Supported Learning
CU –	Control Units
HODs –	Heads of Departments
ICT –	Information Communication Technology
IT –	Information Technology
JAMB –	Joint Admission and Matriculation Board
JSS –	Junior Secondary School
L.G.A –	Local Government Authority
NBTE –	National Board of Technical Education
NCE –	Nigeria Certificate in Education
NCCE –	National Commission for Colleges of Education

- NERDC – National Educational Resource and Development Centre
- NPE – National Policy on Education
- NPEC – National Primary Education Commission
- NTI – National Teachers Institute
- NUC – National University Commission
- PhD – Doctor of Philosophy
- PTA – Parents Teachers Association
- SS 3 – Senior Secondary School 3
- UPE – Universal Policy on Education
- WAEC – West African Examination Council

OPERATIONAL DEFINITION OF TERMS

The following terms are frequently used in this research. It is therefore important to define them so as to facilitate full understanding of the whole study.

Assessment: Assessment means is to evaluate the process of teaching and learning of

Computer science education: the curriculum, materials, and general methodologies.

Implementation: Implementation refers to putting all the learning experiences into

Practice for the purpose of achieving the stated educational goals and objectives.

Computer Science Education: computer education the course of study which is offered at

the colleges of education with aims to acquire computer skills and its application in teaching and learning process.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Education is an instrument par excellence for effective national development. It therefore remained a social process in capacity building and maintenance of society. According to Ayo (2011) Education is the process through which individuals are made functional members of the society through transmission of knowledge, skills and attitude. Thus, education promotes better health increases skills and higher productivities, providing chances to live in dignity and make wise and rationale decision about one's life. In line with these views, the Federal Government of Nigeria in her National Policy on Education (NPE, 2004) adopted education as an instrument par excellent for affecting national development and steps that education will continue to be highly rated in national development plans. Education, therefore, makes a nation/country to spell out in clear and unequivocal terms the philosophy and objectives that underlie its investment for the development. In Nigeria, it is observed that science education emphasizes the teaching and learning of science process and principles. This leads to fundamental and applied research in the sciences at all levels of education.

Tertiary education is the type of education given after secondary education; also colleges of education are among the institutions that provide such kind of education. The courses offered in the colleges of education as tertiary education institutions include: sciences/technical education in which computer education is among them.

Computer education is of paramount importance to the nation development and it is on this premise that the federal government of Nigeria sought to introduce computer studies in the education system from primary to higher institutions. In line with this NPE (2004) has clearly explain that Nigeria cannot afford to ignore the role which computer literacy plays in achieving the national goals of technological development considering the fact that, educational system

around the world face formidable challenges that taxing conventional strategies. Fresh approaches are needed to address persistent problems of the past and provide student with an education relevant to the needs of the modern information based global economy.

Therefore, from the foregoing, based on the importance of computer to teaching and learning, it is obvious that introducing the system can be said to be in the right direction. Fajola (2001) asserts that, the computer is diligent and consistent in its mode of operation to perform multi-functional roles in teaching and learning process at all levels of education. Computer is an electronic device which can hold vast quantities of information and accurately store and information for use. It is capable of carrying and processing input calculation according to predetermined set of instructions. Computer is used in establishment like banks, power holding company, independent national electoral commission, payroll processing, examination conduction, diagnosing sickness in hospital, engineering and management in general (Mbam, 2000).

Hence Nigeria has resolved to introduce computer education in primary and secondary schools, there is need to produce professional teachers in the discipline. Although, there has been provision for the training of computer scientist in the universities and polytechnics, but little attention was paid to the training of teachers in the computer education (NCCE, 2012).

However, it was stated clearly in the NCCE (2012) guidelines that, computer education curriculum are meant to achieve objectives as: To teach computer studies at primary and school levels; write computer programme and process data with maximum speed and accuracy, demonstrate reasonably high level of competence in the preparation for further studies in computer science education, motivate pupils interest in the study of computers by appropriate using ICT Teaching –learning strategies and apply the use of computer as an aid in daily life activities. All the aforementioned objectives cannot be attained without the provision of effective teacher education programme through the colleges of education. For this reason therefore, this

study intend to investigate how computer education programme is implemented in colleges of education in Kano, and Jigawa states respectively.

In the educational system, the computer is a powerful teaching tool and as a medium of instruction that has helped to improve students' performance in school subjects and has taken care of problem confronting teachers. It guides a student through a course of instruction and in such way to facilitate understanding of the subject matter. The application of computers in the teaching and learning is really topical; and thus, computer programme facilitates communication between students and teacher and beyond the classroom setting, like distanced students' instruction. It should be noted that computer cannot replace teacher, it is rather an extension of the teacher, blackboard and other teaching materials (Adamu, 2000). Afolabi (2001) explains that the National Policy on Education (NPE) indicated the government intention to improve the quality of education in Nigeria through the use of computers in our classroom.

There is no doubt that computer education produces and promotes competency and efficiency in teaching/learning process. But the magnitudes at which the computer education facilitates quality of teaching attract little concern from academics and policy makers in this part of the country. Thus, this study aimed at finding out the extent at which computer education curriculum is properly implemented in colleges of education in Kano and Jigawa States for the production of effective computer education teachers especially at the lower levels of our education (pre-primary, primary and secondary levels).

1.2 Statement of the Problem

Education is an all-round development that requires the need of so many resources for proper teaching and learning. Computer either as an instructional material or as a field that one intends to studies is highly needed in this present world of computerization of almost all aspect of life. Right from time immemorial computation and computerization has significant role in the education system.

Computer education is one of the recent educational programmes that attract policy makers in education, educators and educational institutions which are now in full capacity in all the educational institution and it is pursuit up to the highest level of education programme (Ph.D.). Provision of available and relevant materials to help in the implementation of any educational programme at any level of education is one of the major sources of problems to the implementation of any programme.

It should be clearly noticed that provision of available and recent computers is one of the basic requirements in the implementation of computer education programme in our educational institutions, apart from the employment of adequate and qualified personnel. Both teaching and non-teaching staff are equally important on the implementation of computer education programme.

Some researches shows that, one of the major problems in Nigeria's educational system is the fact that almost all the necessary materials needed for proper implementation of educational programme are not available leaving our teachers at all levels with explanation of an abstract material which ideally required to be provided for teachers to use and for learners to see use and make learning more concrete and meaningful.

In Nigeria's colleges of education, computer education programme is introduced and some computer labs and computer practical classes were provided with little or no other required facilities (computers, keyboards, mouse and electricity). Which computer education programme could not be done without them, all these coupled with overcrowded class size retards the implantation of the programme. Heavy literature on the implementation of computer education programme in Nigeria Primary and Secondary schools (public) level of education also stresses the inability for a school or college to adopt computer education as requisite course/subject for its curriculum resulting in producing unqualified teachers to teach computer education. Thus,

will be resulted to poor performance on the part of students especially, on the use of modern facilities such as, electronic media based instruction in teaching and learning process. However, inability to implement computer education curriculum properly in the colleges of education can be resulted to poor utilization of modern facilities which can lead to produce unqualified computer education teachers in our primary and secondary schools all over the nation. This also leads to the poor improvement on ICT which is among the most recent trend in education.

This is the right time in which a study of this nature is highly needed. The fact is that in recent times, the world has witnessed a rapid increase in the technological innovations. The erathereforeushers in the advent of the electronic computer system among other modern technologies. In schools, computers are widely used; and the need for computer technology and literacy in the educational system has become more relevant. Therefore, this study seeks to investigate the situation of computer Education in Nigeria especially the process of implementation in Colleges of Education.

1.3 Objectives of the Study

This study is carried out to achieve the following objectives:

1. Examine the extent to which laboratory facilities and equipment are adequately provided for the implementation of Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa States.
2. Determine the adequacy of the provision of manpower for the implementation of Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa State.
3. Ascertain whether there are adequate funds to implement Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa states.
4. Find out the methodological approaches adopted for the implementation of Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa states.

1.4 Research Questions

In line of the research objectives, the following research questions are addressed:

1. To what extent are laboratory facilities and equipment adequately provided for the implementation of Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa States?
2. What is the extent of the provision of adequate manpower for the implementation of Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa States?
3. To what degree are funds adequate for the implementation of Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa states?
4. What are the methodological approaches adopted for the implementation of Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa states?

1.5 Hypotheses

The study tested the following null hypotheses at 0.05 alpha:

1. There is no significant difference between teachers and students opinion on the adequacy of laboratory facilities and equipment for the implementation of Computer Science Education (CSE) at Colleges of Education in Kano and Jigawa states;
2. There is no significant difference between teachers and students opinion on the provision of adequate manpower for the implementation of Computer Science Education (CSE) at Colleges of Education in Kano and Jigawa states;
3. There is no significant difference between teachers and students opinion on the adequacy of funds for the implementation of Computer Science Education (CSE) at Colleges of Education in Kano and Jigawa states;
4. There is no significant difference between teachers and students opinion on the methods employed for the implementation of Computer Science Education (CSE) at Colleges of Education in Kano and Jigawa states;

1.6 Basic Assumption of the Study

The basic assumptions of the study are as follows.

1. The lecturer(s) and Students should appropriate used of the knowledge computer science such as computer assisted instructions (CAI) in their teaching and learning process for the purpose of enhancing students' academic performance in various course of study which are related to acquisition knowledge and skills in colleges of education in Kano and Jigawa state.
2. Laboratory facilities should available in both Kano and Jigawa colleges of education for effective teaching and learning of computer science education this will provide well trained and qualified students teachers during their teaching practice exercise and improve the lower and upper basic level of education in Kano and Jigawa States.
3. If the students are taught with adequate computer laboratory facilities students' academic performance will be very high especially in learning of computer science education and the society benefit more by the productivity of the students as works after graduating from state colleges of education in Kano and Jigawa States.

1.7 Significance of the Study

The beneficiaries of this study are: students, lecturers, curriculum planners, government institutions of learning, researchers in computer science education, national commission for colleges of education (NCCE), and society at large.

Students of colleges of education, especially those that are offer computer science education and other related subjects, should benefit by this study through consulting it in the course of writing their research when making reference in related to their studies whether published or unpublished research work.

Lecturers should use the findings of this as a guide to develop interest in computer utilization especially when conducting academic research as well as the encouraging of students to actually engage in the use of computers towards boosting academic excellences.

Curriculum planners also should benefit by the use of this study through implementing in the process and applying the strategies and techniques that are stated in solving immediate problems which are associated with teaching and learning process, in the process of developing computer education curriculum and related disciplines.

Government should benefit by the use of the findings of this study, in order to provide required facilities and equipment of computer education in schools which were stated in this study for the improvement of teaching and learning situations, this would no doubt the academic performance of students in computer science and education at large.

Institutions of learning like, colleges of education and universities may benefit by using this research work as written materials for future references.

Researchers in computer science education may benefit by this study while conducting a research on related topic to serve as reference.

National commission for colleges of education (NCCE) should benefit by this study through identifying the problems militating against the proper implementation of computer science education cited in the study for the purpose to enhance the quality of its minimum standard when the need arises.

1.8 Scope of the Study

This research concerned with the implementation of computer education curriculum in Nigerian higher institutions with specific reference to colleges of education. The study is limited to the assessment of the implementation of computer education programme in Kano and Jigawa states colleges of education which comprises Sa'adatu Rimi College of Education Kumbotso, Kano and College of Education Gumel Jigawa state. In this respect, the study assessed the degree to which Kano and Jigawa States colleges of education implements good computer education in most of their teaching and learning process. Therefore, the availability of manpower, computers,

laboratories, projectors, ICT and other equipment necessary for effective computer education programme are observed.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

Today, computer technology in schools (primary to higher institutions) is one of the most far reaching and fast growing development in education. An attempt is made in this chapter to review related literature on the implementation of computer education curriculum. Related literatures were reviewed in the following areas: conceptual frame work – concept of computer, computer education, importance of computer education computer education in Nigeria. Curriculum innovation, computer education as an innovative curriculum, reasons for curriculum innovation, steps in curriculum innovation in Nigeria curriculum implementation and its principals, theories of curriculum innovation requirement for successful implementation of computer education and review of related imperial studies.

2.2 Conceptual Framework

This research work gives conceptual framework that are related to the title of this study for the purpose to give the reader(s) an insight knowledge about what the study is built on. It involves the detail explanation on the conceptual terms related to computer education, curriculum innovation, curriculum implementation and curriculum evaluation.

2.2.1 Concept of Computer

The term “Computer” originated from Latin word “computare” which means calculate or programmable machine. The letters of “computer” have some specific meaning that is C stands for calculate, O = operate, M=memorize, P=Print, U= Update, T=tabulate, E=edit and R=response (Singh, Sharma and Upadhya 2008).Computer can be defining as a machine that performs task such as calculations or electronic communication, under the control of a set of instructions called programme. The programmes usually reside within the computer and are retrieved and processed by the computers electronics. The programme results are stored or routed

to output devices, such as video display, monitors or printers. Thus, devices perform a wide variety of activities reliably accurately and quickly. Computer can be regarded as any machine that is capable of storing, processing and retrieving data. (BukaliandMubika2011). Adekemi (2001) defines computers as combination of related devices capable of solving problems by accepting data and supplying the results of these operations. Hence, computer could be said to be a man – made up of electronic components that operates information at a very high speed to produce results that are meaningful to the user. It is basically a processor of information. Computer is a machine designed to make life easier due to its speed, accuracy, ability to store large quantity of information and to carry out human intervention. Computers, irrespective of type and size have five basic parts namely, input unit, memory units, control units (CU) Arithmetic and logic units (ALU) and output units. Both ALU and CU are joined into one piece of hardware known as central processing unit (CPU) which is the brain of computer (Adekemi, 2001).

The computer is a technological innovation under the control of stored programme that can perform some of the intellectual roles of man even beyond human capability. It is a power driven machine equipped with keyboards, electronic circuits' storage compartments and recording devices for the high speed performance of mathematical operations.

Reith (1993) defines computer as an electronic device which stores information on disc or magnetic tape; analyses it and produces information as required from the data on the tape. Sharing the same view with Reith (1993), Kingsley (1995) defined computer as a device that accepts data in one form and processes it. Going by the above explanation, computer is an electronic device, which works under a set of instruction and accepts automatically the data supplied to it, process and analyze the data and produces the information.

Singh, Sharma and Upadhya (2008), further say computer is known as electronic brain. It is a speedy electronic device which is designed to accept and store data in the form of information.

The history of computer dates back to the ages of scientific revolution (1543-1678). The calculation machines invented by Pascal Blaise and that of Goffried Leibniz marked the genesis or beginning of the application of computers in industries. Another interesting development of computer started in Cambridge England by Charles Babbage in 1812. He began to design another computer in 1822 (Lee in Farouk, 2004).

In 1850 a great advance was made in the history of computer. The power and strength of computer have earned its global acceptance and become the most cherished tool in the world. In the past few years most developed countries have made a radical and pervasive change in all their facets of lives as a result of computer education. Hakwaridge in Farouk (2004) opined that “Computers are at the heart of this revolution because they are fast information processing machines”.

2.2.2 Concept of Computer Education

Computer education is the effort or the ability to make the generality of the people computer literate. Computer literacy means ability to tell the computer what you want it to do and understand what the computer says. To be computer literate means to be able to read, write and speak the language of the computer (Ajibade, 2006). Computer education encapsulates computer literacy, Computer Assisted Instruction (CAI) and Computed Appreciation. Among the terms used to describe computer in learning environment are; computer – Based education (CBE), Computer Managed Instruction (CMI), Computer Supported Learning (CSL), Computer Assisted Instruction (CAI) and the like.

Therefore, computer education refers to the application of tools; the study development and application of devices, machines and techniques manufacturing and productive process. Computer in various forms has always held forth the promise of the improving education. Lawan, (2009) explains that many constructivist of computer education were initially critical of the use of computers in schools, because they equated the use of computers with behaviorist

recognized the computer as a potentially and designed programmes that took advantage of constructivists beliefs. The result has been computer based programs that promote higher level thinking and encourage collaborative learning.

2.2.3 Importance of Computer Education

Computer performs multi-functional roles in teaching and learning processes at all levels. At primary and secondary levels of education students can explore and generate learning through computer education programme. At the tertiary level, computer can be used to store the daily or weekly observation of experiments in science. It can be used to mix colour, separate colour, scan draw, and design various things and create charts and graphs for instructional purpose (Ajibade, 2006).

The computer is a tireless, relentless, evaluating teacher which has several modes of instruction at its disposal such as sound, sight and touch. According to Baugher (1999), in language, a computer can present words to be spelled, sound to be made, instructions to be followed, images and symbols to be responded to by touching. Computer can be used to evaluate students' performance and direct student backward, forward and sideways for appropriate learning activities. Its patience, memory and endless capacity for details are assists that defy competition from ordinary teacher. Fajola (2001) says that computer might also be used to handle the extremely complex programmes that are necessary for more individualized learning. Computer can present diagnostic test, provide branched programmes to accommodate individual needs, and furnish prescriptive assignments that might refer the student to a textbook, a laboratory experiment or a consultation with the instructor.

Computer can provide a convenient technique for designing and developing a course of instruction it can equally provide dynamic interaction between students and instructional programme not possible with most media. Abimbade (1997) identified some potentials of computer in instruction as follows:

1. Computer helps students to learn at their own pace.
2. It produces significant time saving over conventional class room instruction.
3. It allows students control over the rate and sequence of their learning.
4. It gives appropriate feedback.
5. It promotes individualized instruction through personalized responses to learners 'action to yield a high rate of reinforcement.
6. It provides a more positive affective climate especially for slower learners.
7. It provides appropriate record-keeping and thereby monitors students' progress.
8. It puts more information in the hands of teachers.
9. Novelty of working with a computer raised students' motivation.
10. It provides reliable instruction from learner at any time of the day and allocation
11. It direct instruction to learners
12. It provides instruction at comparable expenses to other media.

Computer is a machine that eases human lives. It is useful to the life of many men and has become the best machine of not only of this century; it is the best machine amongst all machines that are ever invented by men up this time. This machine however, was not invented overnight; it is the child of many hundreds of thousand years of research (Singh, Sharma, andUpadhya 2008).

Computer thus has made human lives faster and precise, it is the most valuable contribution of man in the present century. It is widely used in many fields of study – including education, banking, and health, transport to mention but a few.

Computer is a device which can compute from the onset, computer was meant to perform mathematical calculations alone; but now it can do a variety of tasks which men cannot do easily (Singh, Sharma, andUpadhya 2008).

Computer plays important role in many spheres in life. In today world, education is not exception in these changes. Hokansonand Hooper (2000:537) says “despite a history of achieving

only marginal benefits from using technology in education, many schools and other educational organizations are investing heavily in computer technology". Chapman (1998:65) argues that computer plays important role in Child's education:

Computers are transforming communication and the economy, and every child should be exposed to this technology to understand the significance of this technology. Every high school graduate should know how to use a computer and internet, understanding how a computer works, have some grasp of how to find information of the internet, and generally known how computers are used by the business, the government, educational institutions and people in their homes. At a bare minimum, students should know how to type, how to use a word processor, how to 'drive' an operating system and how to navigate the internet.

The potential of computer technology to enhance teaching and learning has been recognized for some time. Generally, it is accepted that computer technology has potential to enhance teaching and learning and provide student with a learning experience that other strategies cannot provide (Wellington, 2005). Schools have also recognized that the use of computer in teaching-learning process is important as it present unprecedented challenges that help student to acquire an inquisitive, critical and creative mind to capitalize on the opportunities driven by the explosive growth of information, knowledge and technology (Cuban, 2001).

In view of the above, computer technology has opened wide opportunities for school teachers to integrate computers in teaching-learning process and improve the achievement of students (Jonassen, 1995). According to Mouza (2002), the application of computer in teaching learning process offers various importance such as cheap accessible and instantaneous information, enormous potential for interactive and media-rich communication, and powerful educational tools that will put at the service of students. MartinandOfori-Attah (2005) identified that teachers could use computer for different purposes like teaching purpose, administration purposes, and personal purposes. However, means and Olson (1995) student learning and produce higher academic achievement in a variety of subject areas than traditional instruction alone. In order to

equip pupils/students with technological skills to make a significant contribution should be given to how to integrate computers in to teaching and learning.

The belief that it was possible to design instruction so that all students could learn led to an interest in the design of learning materials and in a systems approach to instruction. In the same vein, many constructivists were initially critical of the use of computers in school because they equated the use of computers with behaviorist theories of learning. But luckily enough other constructivists recognized the computer as a potentially and designed programmer that took advantage of constructivists beliefs. The result has been computer based programs that promote higher –level thinking and encourage collaborative learning.

2.3 Computer Education in Nigeria

The national programme on computer education as put in place by the federal government of Nigeria was received with open arms and regarded as a new instructional practice in Nigeria institutions of learning. Computer Education was perceived as a new instructional system that was designed to improve the quality of teaching and learning and to aid technological and socio-economic development. This was further corroborated by the then federal minister of education, Professor Jubril Aminu in his address to the committee on computer literacy in Nigeria that the objectives of the nation's computer education programme, among other things were as follows:

1. To bring about a computer literate society in Nigeria within a short space of time.
2. To enable the present generation of school children as all levels, appreciate the potentials of the computer; and to enable them to be able to use the computer in various works of life and later occupation.

With these loud able objectives, all state governments throughout Nigeria follow the federal government policy to introduce computer education and literacy in schools in 1997 with the following general objectives.

1. To bring about a computer literacy in each state in Nigeria.

2. To develop the use of computer as teaching tool in all subject areas and to familiarize students with the use of computer in various aspects of life and later occupation; and to expose the teachers and the students to the latest scientific knowledge and skills.

According to National Computer Policy (1988) computer education programme was introduced to bring about computer literate society in Nigeria and appreciate the economic, social and psychological impact of computer. During the 32nd ministerial council meeting of the national council on education in 1987, the federal government of Nigeria decided to introduce computer into nation's secondary school system. This followed by the inauguration of the national committee on computer education the same year. The function of the committee include "planning for dynamic policy on computer education and literacy in Nigeria as well as devising clear strategies and terminologies to be used by the federal and state government in introducing computer education" (Nigeria Tribune, April, 1988). The general objectives of the policy include.

1. Bring about a computer literate society in Nigeria by the mid – 1990's.
2. Enable present school children to appreciate and use the computer in various aspects of life and in future. (Report on national committee on computer education,1988). The modalities and the strategies for achieving the stated objectives includes:
 - a) Training Teachers and associated personnel.
 - b) Hardware facilities
 - c) Software development and evaluation.
 - d) Curriculum development.
 - e) Maintenance of hardware and peripherals.

In any educational system, there should be a good relationship between policy and practice in order to reach a successful implementation. According to Jefer (2002) there is a wide disparity between policy pronouncement and policy implementation of computers education in Nigeria.

He further explain that, the formulation of an information technology (IT) policy constituted only about 20% of the IT solution for the country but the remaining 80% has with implementation in 2001. To this end Maduake (2003) opens that to bridge the gap both policy and practice need to be implemented. The updated policy must be popular and deliverable to all computer teachers in school so that the teachers will be able to implement the philosophy and objectives of the computer education. In addition regular in service training should be granted to teachers who need training on computer operation programming and teaching methodologies. The training should be made open to all school in all levels of education so as to ensure uniform standards. Also most teacher need retraining in integrating IT techniques into instructional methods. Chen (1995) out lined what this training should include:

1. Basic skills
2. Update theories of learning
3. Wide ranging application of IT in education
4. IT Trends in education and common mistake of computer use in education
5. Software evaluation methods and classroom technology integration.

2.3.1 Computer Science Education Curriculum at NCE Level

The term curriculum refers to the lessons and academic content taught in a school or in a specific course or program. Curriculum typically refers to the knowledge and skills students are expected to learn, which includes the learning standards or learning objectives they are expected to meet; the units and lessons that teachers teach; the assignments and projects given to students; the books, materials, videos, presentations, and readings used in a course; and the tests, assessments, and other methods used to evaluate student learning. In fact curriculum can be seen as all learning experiences children are expected to receive/learn under the guidance of the school.

Henderson and Hawthorne (2000) provide the following definitions of curriculum as, "...a plan for a pedagogical journey toward the good life, or students' actual classroom engagement with ideas and ways of knowing...", and "...depending on national, state, and local policy, it may also

be understood as a course of study, a syllabus, or a group of text books or tests "(p. 3). However, using educational concepts, one can say that the curriculum defines the educational foundations and contents, their sequencing in relation to the amount of time available for the learning experiences, the characteristics of the teaching institutions, the characteristics of the learning experiences, in particular from the point of view of methods to be used, the resources for learning and teaching (e.g. textbooks and new technologies), evaluation and teachers'.

Computer studies have been included in the national curriculum for both primary and secondary schools and as a result, the need for trained teachers in the area in teachers' training institute across the country becomes imperative. Therefore, by the end of the teacher training programme, the students are expected to:

- i. Teach computer studies at the primary and secondary school levels;
- ii. Write computer program and process data with maximum speed and accuracy;
- iii. Demonstrate reasonably high level of competence in preparation for further studies in computer science;
- iv. Motivate pupils' interest in the study of computers by appropriately using ICT teaching /learning strategies;
- v. Apply the use of computer as an aid in daily life activities.

Facilities are very essential for effective implementation of the curriculum content and for the realization of the above objectives. Yusuf (2008) defines facilities in the school as the space interpretation of the school curriculum. They can be referred to all non-consumable items, durable physical and infrastructural facilities available in the school for teachers' and students use in order to make teaching and learning effective and thus ensure the achievement of pre-determined aims and objectives of education. Hence, the school facilities include the 'space' within the school premises which houses the basic systems and structures. In a related development, Yusuf and Adigun (2012) state that school facilities comprise the following:

- (i) Machinery: It includes machines and tools used in the workshop, duplicating machines and so on.
- (ii) School site: This refers to the entire landscape on which the school's permanent and semi-permanent structures are built.
- (iii) Buildings: These include classroom blocks, administrative offices, libraries, workshops, laboratories, students, hostels, staff residential quarters, assembly halls, toilets dining halls and so on.
- (iv) Equipment: These consist of typewriters, photocopiers, computers, sporting equipment, laboratory equipment and workshop equipment.
- (v) Furniture: Desks and seats used in the classrooms, office furniture, residential furniture and soon.
- (vi) Vehicles of various types and sizes.
- (vii) Books textbooks, periodicals and all library books.
- (viii) Electrical infrastructure: air conditioners, electrical fans, generating sets and other electrical fittings.
- (ix) Water supply infrastructure: This involves deep wells, boreholes, water tanks and public water.
- (x) Accessories: These include playgrounds, lawns, parks, gardens and farms.

The curriculum cannot be implemented if the facilities required for teaching and learning are not available. Without school facilities, the school cannot exist. To this end, it becomes necessary to ensure that school facilities is properly planned and maintained to make the curriculum implementation effective. Based on the above, the National Commission for Colleges of

Education [NCCE] (2012) state that for Colleges to run a computer studies programme, it is essential that the following facilities should be provided as a minimum condition:

- a. One computer for a group of not more than 2 students
- b. Laboratory for computer studies, which must be air-conditioned
- c. Cabinet for storage facilities
- d. Regular supply of software facilities
- e. One computer centre for training /teaching of other students/commercial purposes
- f. Alternative power supply-Generator

The NCCE (2012) stressed that all computer systems must be full multimedia system whose configuration is not less than the following:

- i. INTEL PIV 3GHZ (100FSB) MMX
- ii. 2GB RAM
- iii. 120 GBHD
- iv. DVD ROM Drive
- v. Flat screen monitor
- vi. USB keyboard and mouse
- vii. SUBMIDI PIV casing
- viii. 650 VA UPS for each computer system
- ix. 1000-watt stabilizers for each system
- x. All computers must be on Local Area Network
- xi. Every internet must be connected to the Internet
- xii. Scanners
- xiii. Printer
- xiv. Computer projector
- xv. One laptop for every lecturer of the department

It is also emphasized that due to the dynamic nature and the advancement of information and communication technology (ICT), equipment and software should be updated regularly to meet with the current changes in technology. It is also stressed that qualified teachers should be employed to teach the course and support staff like computer Technologist, Engineer, a Cleaner, a lab instructor and a security staff.

The choice of effective, adequate and relevant teaching technique by a qualified computer science teacher putting into consideration the topic to be taught and the students' level and ability is the starting point and a foundation for attaining effective transaction and communication between teacher and students in computer science classroom. This is because the success or failure of computer science lessons depends on the choice and utilization of effective teaching technique by the computer science teacher. Therefore, the NCE minimum standard indicates that computer studies at NCE level shall be taught by an appropriate selection or combination of the following teaching strategies:

- i. Discussion
- ii. Lecture
- iii. Practical Demonstration
- iv. Tutorials
- v. Supervised Projects
- vi. Students' Guided Practice
- vii. Problem solving/ inquiry method
- viii. Excursion to computer firms
- ix. Seminar
- x. Computer Aided Instruction (CAI)

The teachers as a result of rapid changes in the field of information technology/ computer science are mandated to regularly undergo workshops/refresher programmes in the field and

belong to relevant professional bodies. Therefore, based on the above and a glance through the course content of the three (3) year programme, it can be seen that the NCE computer science curriculum covers the three (3) learning taxonomies as it emphasize on the cognitive, affective and psychomotor domains.

2.3.2 Nature and Scope of Computer Science Education Curriculum

Curriculum exists for students. It is concerned with both content and process. Content refers to what we want students to learn and process refers to how the content is managed. Curriculum must be characterized by a balance of knowledge, skills and attitudes. It must be organized in a logical and sequential manner while making provision for special interest development. It must encourage critical thinking and provide the student with opportunities to develop the ability to make reasoned judgments. To accomplish this, curriculum in NCE classrooms should have a common core and at the same time provide for varying abilities and interests of students through complementary courses and/or optional units within core subjects.

The computer education curriculum for colleges of education is geared towards addressing and covering the three learning domains of the students; namely- cognitive, affective and the psychomotor. This is obvious considering the contents of the three (3) year teacher training programme in Computer Science Education. NCCE minimum standard (2012) identified some of the courses offered which cut across the three learning domains of the students as mentioned below:

- i) Introduction to computer science
- ii) BASIC programming language
- iii) Computer operations and applications
- iv) Introduction to microprocessor
- v) Number system
- vi) Electronic data processing

- vii) Teaching computer science
- viii) Programming language
- ix) PASCAL programming language
- x) Operating systems
- xi) Introduction to numerical methods
- xii) Systems analysis and design
- xiii) Advance level programming language (Java, V-Basic, and COBOL ETC.)
- xiv) Seminar
- xv) Computer Networking
- xvi) Desktop publishing
- xvii) Computer maintenance and trouble shooting
- xviii) Computer graphics
- xix) Word processing
- xx) MS Excel
- xxi) Electronic Spreadsheet
- xxii) SIWES and Teaching Practice

From the above there fore, it is clearly shows that the computer education curriculum for the colleges of education in Nigeria is geared towards addressing and covering the three learning domains: cognitive, affective and psychomotor in teaching and learning process.

2.4 Concept of Curriculum Innovation

Innovation is an act of effecting a change in the established order or introduction or something new. An innovation is an idea or practice which is perceived as new by the potential adopting unit. Innovation in education therefore is a change to accustomed practices in learning or teaching whether in objectives, content or methods. It is usually introduced in experimental situations and for the purpose of improvement (Garba, 1996). According to Okam (1998), the

term curriculum innovation refers to the purposeful changes. This is due to the fact that some changes in the needs and aspirations of the society have purposes. It is a change from the established order that is beneficial to the individual learner and to the society.

Curriculum innovation can be in the form of improvement means changing certain aspects of the curriculum without changing the fundamental conceptions of it or its organization. Yunus (2008) explain the major characteristic features curriculum innovation as follows: -

Realistic and Achievable Objectives

In bringing about any innovation, there must be some objectives and such objectives should be realistic and achievable. They must not be mere dreams, imagination, or copying from another setting, which are fantasy. They must take the social, political and economic atmosphere and available resources into consideration.

Should Contain New Elements

The essence of change is to introduce something new. The new element should be an improvement over the existing one. It should be capable of bringing some form of progress in the element is copied from another setting; it should be tested in such a way that it suits the new environment.

Flexibility

Curriculum innovation must be flexible to allow for adjustments to the changing needs and conditions of the society.

Must Have Been Tested

An innovation should first be tried at an experimental level so that its worthiness and workability can be determined. Besides, at all stages of its implementation, there should be provision for feedback so that adjustments can be made.

Acceptability

Innovations should reflect the needs of the society such that they become acceptable. In other words, the changes should reflect the aspiration, problems and societal values such that they can be seen to be a solution to some existing and projected problems.

Official Support

To effect any meaningful change, the support of those controlling education programmes is necessary. It is the authority that determines the educational policies and how they are implemented. They determine what changes can be allowed that can have some good knowledge of the problems entailed in introducing any change. It is therefore important that from the planning stage the authorities are fully involved and properly informed of the implications of each stage.

Involvement of all Participants

It is important to get all participants involved in the implementation of any curriculum change into the full picture of what is happening. For example, parents, teachers, organizations, employers, sponsors of educational programmes etc. this prepares their minds and gets them acquainted right from the planning stage. To ensure that innovation exerts the required impact, the autonomy of teachers to interpret and implement the changes should be ensured. It is also necessary to ensure an effective communication network about the changes expected so that every part that is expected to implement the change.

2.4.1 Computer as an Innovative Curriculum

Innovation in curriculum connotes purposeful changes. This is due to the fact that some changes from the existing order that do not effect positive changes and development. Therefore, curriculum changes must be beneficial to individual learner, society and entire country. Yusuf (2012) defines innovation as deliberate novel specific change in curriculum. In education,

innovation can be in the area of policy, objectives, content, materials, methods or evaluation strategies.

In addition Yusuf (2012) identifies some important reasons for curriculum innovation as follows:

1. Changing needs and values of the society
2. Dynamic value of knowledge
3. Increase in facilities that improve teaching and learning.
4. New findings in educational research
5. Challenges posed by technology change different part of the world.

Introduction of computer literacy programme at primary and secondary levels of education is an important innovative element in the Nigeria educational systems. According to micro-computer in secondary school (Common Wealth of Nation; 1996), information technology in school is still a relatively new area of curriculum development. As more education become involved and as the technology itself develop now opportunities for education will become apparent. It is important therefore that structures which are created to implement a national project are flexible enough to respond and reacts to develop as they occur. Therefore a programme of information technology needs an organizational structure to support policy information and implementation policy identify existing expressive to ensure the efficient use of resources and facilities communication between the various groups who are involved.

2.4.2 Steps in Curriculum Innovation: the Nigerian Perspective

Curriculum innovation seeks to clear the ground for the building of a new and better structure of the education and a new and better society. The most recent innovative elements in the Nigeria educational system include: introduction of computer literacy from primary to higher institutions of learning, introduction of 9 years universal basic education program i.e. 6 years primary and 3 years Junior Secondary School (JSS), abolition of primary school leaving certificate, introduction of universal basic education certificate at the end of junior secondary school (JSS).

In addition, since the attainment of independence, Nigeria's educational system has witnessed a number of changes (Yunus 2008). These changes were based on policy, content, methodology and evaluation as follows: -

Policy Changes

- 1) The introduction of Universal Policy on Education Scheme in 1976; was to ensure that every child in Nigeria acquire basic education
- 2) The introduction of a single education policy for the entire country in 1977; This National Policy on Education restructures and unified Nigeria educational system now called the 6-3-3-4 i.e. 6 years of primary school, 3 years of junior secondary, 3 years of senior secondary and at least 4 years of university education. This replaced the different structures formally practiced in different parts of Nigeria.
- 3) Establishment of specialized commissions for the different aspects of education; like the National University Commission (N.U.C.), National Primary Education Commission (N.P.E.C.), Commission for Nomadic Education, National Board for Technical Education (NBTE) among others.
- 4) Shift of emphasis from the liberal arts to the natural sciences and technical education. This is to ensure that Nigeria prepares to meet the challenges being posed by the scientific and technological age. Today in Nigeria, Universities are expected to admit at a ratio of 60:40 in favour of Science and Technical Courses. The yearning for science and technology has led to the establishment of special science primary schools, science and technical colleges, polytechnics, universities of science and technology.
- 5) De- board of schools, with a view to reducing cost and ensuring that more students are admitted into schools
- 6) Increased interest in women education and the education for the handicapped and the gifted children education programme

7) Unprecedented expansion of educational institutions

Change in Objectives

When western education was introduced in to Nigeria by the Christian Missionaries, their main aim was to enable beneficiaries to be able to read (especially the Bible), and to write. But when Nigeria was colonized by British Government, the main aim was that of producing middle-level man power for the civil service, and the private sector in 1969, at the National Curriculum Conference, the objectives of Nigerian education were reviewed. Thus, instead of having objectives that were regional, for the first time, comprehensive national educational objectives were developed. The objectives include:

- i. The inculcation of national consciousness and national unit
- ii. The inculcation of the right type of values and attitudes for the survival of the individual and the Nigerian society
- iii. The training of the mind in the understanding of the entire world around
- iv. The acquisition of appropriate skills, abilities and competence both mental and physical as equipment for the individual to live and contribute to the development of his society

Change in Content

Arising from the revolution in objectives, some radical changes were made in the content. At the primary, secondary and tertiary institution, the contents of subjects studied were reviewed so that they would gear toward achieving the set objectives. In addition, subjects like social studies, introductory technology, and moral philosophy were introduced into the school curriculum and given a core status in their relevant levels of education.

Change Methodology

Growing attention is being given to individualize instructions computer assisted instruction and the mass usage of instructional aids, so as to facilitate teaching and learning. Computer education

as recent trend in education emphasized on changes in methodology especially practical activity methods. The rationale here is to meet up the current changes occurs in teaching and learning process.

Change in Evaluation Strategies

With the introduction of the National Policy on Education in 1977, some special emphasizes have been placed in the use of comprehensive and continuous assessment in schools. Besides objectives, multiple choice questions have also been given special attention at both the primary and secondary school levels. Similarly, new attention is being given to practical experiences and tests in the form of teaching practice, and assessed. In the area of language, renewed emphasis is being placed on testing of oral ability.

2.4.3 Theories of Implementing Curriculum Innovation

There are number of theories that govern the implementation of any new innovation not only in curriculum but in anything that has direct bearing with human life. Some other theories related to curriculum implementation are reviewed in the course of this research work as follows;

Diffusion Theory

This study utilized diffusion theory to serve as a plank and a reference point on which the study rest. Roger (1962) defines diffusion as the process by which an innovation is communicated through certain channels over time among member of a social system. He described innovation as an idea practice or object, which is perceive by an individual as new.

Roger (1962) says that the rate at which an innovation is taken up by a group of potential adapters is influenced first by characteristics of innovation itself via:

- a) Compatibility
- b) Complexity
- c) Trainability
- d) Observation

ii) *Characteristics of Adopters*

- a) Level of education
- b) Social status
- c) Cosmopolitanism

Channels of Diffusion Theory

- a. Diffusion theory employs a number of categories of individual one such group is that of opinion leaders. These individuals influence adopter of innovations either positively or negatively.
- b. Communication channels, here information about an innovation is exchanged between individuals or group of individual. They may include mass media as face to face exchanges.
- c. Time, from first knowledge to discussion to adopt or reject.

This theory is relevant to this study because ideas are put together after experts have conducted some research. Results of the research are passed down to the schools for implementation leading to a rational sequence and evaluation of an innovation. However, in this theory the role of the teacher is not central, he is merely the implementer.

Social Interaction and Problems Solving Theory

Havelock (1973), has made one of the most thorough studies of changes process in education he identifies theories of implementation strategies known as Social Interaction (S-I), and Problem Solving (P-S).

The Social Interaction Theory (S-I)

In this theory, ideas for change may start from an individual and through a network of social interactions become adopted by the whole system. For example, a teacher in control may have thoughts about a curriculum. He shares these thoughts with colleagues and eventually this is

taken up at the staff meeting. The principal of the college may raise the issue in the next meeting of principals' forum, etc.

The characteristics of this theory are as follows:

- a. The individual user belongs to a network of social relation which largely influences his adoption behaviour.
- b. His plans in the network are good predictors of his rate of acceptance of new ideas.
- c. Informal personal contact is a vital part of the process.
- d. Group membership and reference group identification are major predictors of individual adoption.
- e. The rate of diffusion follows an S curve pattern – very slow at the beginning, followed by very rapid diffusion, followed in turn by a long late – adoption period.

The main problem with this theory is that communication within the network may be poor, unreliable or unpredictable. Only very few ideas for change ever get diffused into the system this way.

The Problem Solving Theory (P-S)

Five points are stressed by Havelock and Huberman:

- a. User needs as the paramount consideration.
- b. Diagnosis of needs has to be an integral part of the change process.
- c. The outside change agent should be non – directive.
- d. Internal resources should always be fully utilized.
- e. Self – initiated innovation will have the best chance of survival.

The adherents of the problem solving theory say that people have within themselves most if not all the ideas, resources and energy to bring about change. Outsiders may play facilitative roles with temporary infusions of aid or technical assistance, but such inputs are mostly peripheral to the real change process. This theory however leaves much to be desired when viewed separately.

2.5 The Concept of Curriculum Implementation

Implementation is the other side the coin of innovation. Without implementation, innovation is pointless. However, planning and development depends upon the proper implementation. Curriculum implementation simply refers to the actual carrying out of policies and changes spelt out in the new curriculum.

According to Duyilemi (2000), Curriculum implementation entails putting into practice the officially prescribed courses of study, syllabuses and subjects. It includes the provision of organized assistance to staff in order to ensure that the newly developed curriculum and the most powerful instructional strategies are actually delivered at the classroom level.

Kelly (2004), explains that there are two components of any implementation effort that must be present to guarantee the planned changes in curriculum and instruction succeed as follows: Understanding the conceptual framework of the content/discipline being implemented and, Organized assistance to understand the theory, observe exemplary demonstrations, have opportunities to practice, and receive coaching and feedback focused on the most powerful instructional strategies to deliver the content at the classroom level.

According to Lawanand Umar (2010), curriculum implementation entails putting in to practice the officially prescribed course of study, syllabuses and subjects. The process involves helping the learner acquire knowledge or experience as prescribed in the curriculum.

It is well known fact that, teachers are the main implementers. In addition, there are internal and external agencies who are involved in the curriculum implementation process termed as the participants in curriculum implementation including individuals, government, and non-governmental agencies who are responsible for implementing any change in education. In line with this, Urevbu (2001) identifies the teacher as the agent in the curriculum implementation process. She argues that implementation is the manner in which the teacher selects and mixes the various aspect of knowledge contained in a curriculum document or syllabus. Implementation

takes place when the teacher-constructed syllabus, the teachers' personality, the teaching materials and the teaching environment interact with the learner. Curriculum implementation therefore, refers to how the planned or officially designed course of study is translated by the teacher into syllabuses, schemes of work and lesson to be delivered to students.

Lawan and Umar (2010), identifies and explains the participants of curriculum implementation as follows:

Participants within the School

Participants within the school include local school boards of education, Parent's Teachers Association (PTA), principals/headmasters, staff and pupils/students. The classification of local school boards and PTA as participants within the school may not be strictly correct since they are not really members of the school in the way that the staff and students are. However, because of their intimate involvement in the affairs of the school, they may be regarded as participants within the school. PTAs in Nigeria are usually involved in such activities as raising funds for particular projects, like the building of an extra classroom, or a school fence. They are also consulted in such matters as visiting time/hours, pocket money for the children, etc. in boarding schools.

PTA meetings very important for parents to make inputs to the way the school is run and organized. Complaints, fears and queries of parents are addressed in the meetings, and the school has the opportunity to explain change in policies or practices to the parents. Because many parents, nowadays, are very educated and well informed, PTA meetings have become very important in the change and implementation of curriculum.

But, by far, the most important participants within the school are the principal/headmaster, the teachers and the pupils/students who are finally responsible for carrying out, on day-to-day basis, the details of the task of curriculum implementation. Below are the roles of this category of participants.

The Principal/Headmaster

They are the heads of the administration as well as the academic head who exercises tremendous influences in curriculum implementation in their schools.

As the administrative heads, they bridge between the government, their staff and students. Important policy changes are channeled through them and although staff may be employed and sent to them by the ministry, actual deployment of staff to specific responsibilities within the school is done by them under a general guideline. In fact the kind, quantity and quality of staff sent to them from the ministry may partly depend on their recommendation or their ability to lobby ministry officials successfully. One can see therefore that the headmaster is a very important participant in curriculum implementation.

As the academic head, he is just as important. The appointment of heads of department is either directly done by him or greatly influenced by him. Day to day staff discipline and sanctions for breach of conduct come directly or indirectly under him. Where there is a disciplinary committee, he is most probably the chairman of the committee. If recommendations are to be made to the ministry for severe sanctions, like dismissal, he is the one to make it. He also has the same role to play in student's discipline.

The education philosophy of the headmaster/principal as academic head is of crucial importance. No matter what the new curriculum preaches, if the headmaster is not convinced or if he holds a contrary view or philosophy, he will have a crucial say in how this new curriculum is implemented. Sometime in the late 1980s when the new curriculum under the 6-3-3-4 system was de-emphasizing the study of history and geography as separate subjects in the junior secondary school and replacing them with social studies; and biology, physics, chemistry and replacing them with integrated science, the principal of Faith Tabernacle, JarawanKogi, Plateau State at the time policy was wrong, and his school continued to teach these separate subjects for a long time after most schools had complied with the new policy. In this kind of situation, the

government forcing a change will eventually win since they have the power over accreditation and national examinations. The point being made here, however, is that the headmaster can and does exercise a lot of influence in how curriculum is implemented in his school.

The headmaster's main power lies in the fact that he is the accounting officer who controls the financial and other resources supplied by the government via the ministries or local government authorities and the PTA. He is required to follow standard accounting procedures as may be contained in an accounting manual supplied to him by the ministry, but the day-to-day disbursement of funds and resources is left at his discretion. In his position therefore as the controller of resources, he can give or deny support to a programme.

From the above explanation, it is apparent that principal and Headmasters are primary agents of curriculum implementation, hence they need to be consulted to give out their verdict in whatever government intends bringing in to the curriculum. These agents (Principal and Headmaster) associate with students and society members, so they have good understanding of people's aspiration.

Participants outside the School

In Nigeria, participants outside the school include the ministries of education, university institutes of education, boards of education, federal government education control bodies, National Teachers Institute (NTI), National Educational Research and Development Centre (NERDC), joint Admission and Matriculation Board (JAMB), West African Examination Council (WAEC), National Universities Commission (NUC), and foreign aid organizations. They plan or assist in the introduction of innovation or change to the school. The role of outside participants may vary from that of giving quiet assistance and logistic support to curriculum change to active participation in mapping out change and the implementation. We shall briefly discuss two outside bodies implicated in curriculum innovation and implementation in Nigeria

which exemplify the roles described above. The two bodies are the university institutes of education, and the National Commission for Colleges of Education.

The Institutes of Education

One of the major roles of university institutes of education is to provide in-service training to teachers from the schools. They also run short courses and seminars in relevant areas of education. A particularly good example is the Institute of Education of Ahmadu Bello University, Zaria. This Institute has been involved extensively with ministries of education, especially in the northern states, in mounting long vacation courses for teachers in such areas as primary education supervision and administration, secondary school education, library sciences, language methodology, and sociology. It also runs a five-year distance education programme to upgrade Grade II teachers to Nigeria Certificate in Education (NCE) standard. At the time of writing this book, however, the institute of Education is sadly in decline due, in part, to bad administration by its authorities, and to funding problems arising out of the National Universities Commission's decision not to fund non-degree awarding programs of the university. It remains to be seen whether ways will be found to ensure that this Institute will continue to offer its invaluable services to education especially in the northern parts of the country.

National Commission for Colleges of Education (NCCE)

Established under Decree 3 of 1989, the NCCE has the following among others, as primary function:

Advise the Federal Government to co-ordinate all aspects of Teacher Education failing outside the Universities and Polytechnics;

- a. Make recommendation on the full development of teacher education and the training of teachers;
- b. Collect, collate and publish and publishable information on Teacher Education in Nigeria;

- c. Determine the qualified Teacher needs of the country for the purpose of planning training facilities and in particular prepare periodic master plans for the balanced and coordinated development of Colleges of Education.

The NCCE is a good example of an outside agency set up to intervene in curriculum change. Until 1989, colleges of education were run by states or universities without a central body to coordinate their activities or maintain uniform standards. In this situation it was impossible to compare two colleges of education in terms of performance of the quality of their products. Admission of NCE applicants for degree courses presented difficulties to the universities. Ahmadu Bello University, for example, readily accepted candidates from the ATCs at Kano and Zaria which were affiliated to it, and whose standards it was sure of, but were reluctant to admit candidates from some state colleges of education. With the advent of the NCCE, however, minimum standards have been defined and are currently being reviewed for all colleges of education in the country, and accreditation of all colleges of education have been done. The NCCE is, therefore, an outside organization very actively involved in the change and implementation of curriculum of teacher education.

2.5.1 General Principles of Curriculum Implementation

The process of curriculum implementation involves the translating of a complex plan into new patterns of action the curriculum implementation connotes the multifarious terms in to class practice. PlomandAkker (1988) pointed out that, implementing a curriculum conveys change, which implies social action that builds a climate of acceptance for change. Major influence in curriculum implementation includes the degree of innovation envisaged in the curriculum, its complexity explicitness, feasibility and adaptability. Plom and Akker (1999) further stressed that implementing a curriculum includes; establishing acclimate of trust, implementing changes that meet the recognized needs, consultwidely, establishing clear goals and limited scope, developing

an ethics of the collegiality, using personal contact, providing systematic in service training, providing time and recourses, trying not to change every one and not despairing.

In view of the above, one can note that, stakeholders in curriculum implementation have important role to play. Therefore, they have to prepare to work together as a team to put the curriculum in to action so as to benefit students. The more involved of various stakeholders are in curriculum implementation, the more likelihood is for successful implementation. However, Odera (2011), argues that the success of integrating computers in to education in developing countries like Nigeria depends strongly on how teacher have been prepared to use computers. Teachers are the backbone in any curriculum implementation. Therefore, they must be trained properly in the use and integration of computers into curriculum to benefits students. The more involved of various stakeholders are in curriculum implementation the more successful implementation will be.

Implementation is the process not an event which occurs over a long period of time, consequently all factors must be continually addressed including support and coordinating the government.

According to Hawkrige (1999) curriculum implementation is generally acknowledge to be one of the most problematic areas of institutionalized education. This is due to the fact that it is the process of translating a complex concept or plan into new patter of action.

Hawkrige's view may be that it is difficult for someone to implement a curriculum hence it consists ideas of many people. This view reflects the current situation of Nigeria.

2.5.2 Requirements for Successful Implementation of Computer Education

For any curriculum to be successful it must meet the peoples perceived need and these needs must be effectively be implemented. According to Odera (2011) much emphasis is given to the following elements for curriculum to be successfully implemented.

- a. Resources:** The provision of adequate facilities (resources) in implementation of any curriculum is very necessary for the survival of the programme. Adequate resources are essential requirement for effective implementation of curriculum.

The above view was supported by Fisher (1988) opines that equipment need to be purchase for teachers and students. By resource here, it means facilities the effectiveness of implementation. A new program must be supported with all required facilities to enable the program to sustain.

It is been observed that lack of adequate resource may lead to the total collapse of the entire program.

- b. Finance:** To keep the program in motion, there must be adequate funds to maintain the existing facilities and buy new ones, to keep abreast with time. Lack of adequate funds led to the collapse of universal Primary education (Oloye1981).

In view of the above, lack of good funding is one of the factors responsible for the failure of many important educational programs in Nigeria.

Thus, if money is made available for the implementation of the program and are used in the proper ways the goal of implementation would be achieved.

- c. In-Service Training:** Teacher already trained before the emergence of new ideas in education requires in-service training. It is the kind of training the teachers received on the job in order to improve their knowledge of the subject matter and skills.

Sehr (1997) agreed that “a constant training in the literature regarding the use of computer in schools is the need for more and better teacher training.

- d. Manpower:** The success of any program depends to a great extent on the availability of quality of the teachers. Teacher must have the ability to handle the program with confidence.

The problem of inadequate and qualified teacher may be a serious setback to the implementation of a new program. Therefore, time and resources should be invested to secure well-qualified teacher in order to achieve the goal. Borman (2004:05) has observed that “teachers must be prepared for the new technology journey”.

- e. **Time:** Programme must be given sufficient time like all other subjects. It is significant to note that the more time the students are given the better chances they have to acquire skills and ideas. The time factor surrounding the implementation process is view by teachers as being a major barrier in using computers. Stallard (1998) contends that teachers face a number of potential interruption during the typical hour long class and that, consequently the actual time spent teaching and learning is shorten significantly.

Many of the reported problems that schools and teachers face when implementing computer show great similarity with kind of problems often experienced in curriculum implementation. In view of this fullan (1992) Velzen, Miles, Ekholm, Hameyerand Robin (1995), identified some strategies/variables four successful implementation of computer education and other curriculum innovation as follows:

National context

Central legislation and regulation

Systemsof policy formation and decision making in educational affairs

Time resources and facilities made available

Proclaimed values and aims about an innovation

Attitudes of politicians and other opinion leader about an innovation

School organization

Experiences with earlier innovation

Role of the school leader

Methods of decision making

Available facilities (time money, materials)

Internal co – operation and mutual support

Distribution and exchange of information

External support

In services training

Coaching and guidance

Assistances with internal staff development

Personal contacts with experts and colleagues from other schools.

Innovation characteristics

Relevance of the innovation for needs and problems of users

Clarity of the goals and practical meaning of a change proposal

Complexity of innovation requirements especially in teaching behavior

Quality and practicality of the innovation products

It is imperative for teachers to consider the characteristics of the innovated products before putting them into use, some products are not relevant to some societies, and hence they (product) course serious havoc to the morale of a society.

2.6 Provision for the Implementation and Current Practices of CSEC

Implementation of the curriculum is the last stage in the curriculum development circle.

The curriculum cannot be implemented if the facilities required for teaching and learning are not available; without school facilities, the school cannot exist. To this end, it becomes necessary to ensure that school facilities are properly planned and maintained to make the curriculum implementation effective. Based on the above, the National Commission for Colleges of Education [NCCE] (2012) state that for Colleges to run a computer studies programme, it is essential that the following facilities should be provided as a minimum condition:

- a. One computer for a group of not more than 2 students

- b. Laboratory for computer studies, which must be air-conditioned
- c. Cabinet for storage facilities
- d. Regular supply of software facilities
- e. One computer centre for training /teaching of other students/commercial purposes
- f. Alternative power supply-Generator

Moreover, the NCCE (2012) stressed that all computer systems must be full multimedia system whose configuration is not less than the following:

- i. INTEL PIV 3GHZ (100FSB) MMX
- ii. 2GB RAM
- iii. 120 GBHD
- iv. DVD ROM Drive
- v. Flat screen monitor
- vi. USB keyboard and mouse
- vii. SUBMIDI PIV casing
- viii. 650 VA UPS for each computer system
- ix. 1000-watt stabilizers for each system
- x. All computers must be on Local Area Network
- xi. Every internet must be connected to the Internet
- xii. Scanners
- xiii. Printer
- xiv. Computer projector
- xv. One laptop for every lecturer of the department

The above are the main requirements that should be put in place to ensure effective implementation of Computer Education curriculum in colleges of education as enshrined in the

NCCE minimum standard published in 2012. Nevertheless, the schools in the study area are up and doing in ensuring the provision of adequate facilities required for the effective implementation of the computer education curriculum for maximum output.

Although there might be some challenges and hitches here and there with regards to the implementation of the Computer Education Curriculum, at least minimum standard are met in majority of the Colleges of Education. The regular routine supervision of the NCCE has helped in keeping the standards.

Moreover, the interventions of various agencies both governmental and non-governmental have assisted the departments in securing materials and resources that are beyond their bounds. Popular among the donors are the TETFund, the ETF, and the MTN among others. Moreover, the colleges of education are also improving on the employment of qualified and competent hands to handle the course. The students' industrial work experience scheme (SIWES) is an effective way of assisting the students to translate the theories and other practical learned into real world practices. Therefore, one can say without fear that the current practices with regards to the implementation of Computer Education Curriculum in Nigeria have met the minimum standards.

2.6.1 Strategies for Evaluating CSEC in Colleges of Education in Nigeria

Students' assessment and evaluation are an integral part of the teaching and learning process and as such must be thoughtfully integrated in the planning and delivery of curriculum. Students require timely, constructive feedback to support their learning. The teacher is best positioned and most responsible for monitoring, assessing and evaluating student learning as well as reporting this learning to parents or guardians

The information for evaluating students' performances at Colleges of Education especially with regards to Computer Education can come from the students, personal observations, peers or mentor's observations, and the students' work. Over time, using several methods from this list

will ensure that one obtain diverse but complementary perspectives on many facets of teaching and/or curriculum.

Student Evaluation and Feedback

Students' feedback is a rich and valuable source of information for both formative and summative purposes. For this reason, students' feedback and evaluation are key components of the NCCE Quality Enhancement Framework, as well as providing summative evidence for staff promotion, probation and awards, and for internal and external quality assurance reporting requirements. Methods of obtaining students feedback may be formal or informal, structured, semi-structured or unstructured. They include surveys, minute papers, focus groups and student consultations. These form part of the evaluation strategies as recommended by the NCCE for computer science courses

1. More information about obtaining and using students feedback and evaluation, including methods, resources and related policies and procedures.
2. Teaching Evaluation for Development Service (TEDS)
3. Order TEDS surveys (Learner Experience of Unit, Learner Experience of Teaching)
4. Peer observation and review
5. Students Industrial Work Experience Scheme (SIWES)

Colleagues from one own and other disciplines are often a good source of data for evaluating your teaching and units, providing professional feedback and guidance. You can find out how they perceive your teaching, how your unit prepares students for involvement in subsequent units, and any aspects of your teaching you might try to improve. Peer observation and review of teaching and/or curriculum can be undertaken for a range of purposes, both formative and summative. Approaches range from informal, semi-structured observation by, and feedback from, a friendly work colleague, to highly structured, formal schemes aimed at providing

evidence for promotion and other reward processes. Peer observation and review methods, activities and resources.

Self-observation, self-assessment and critical reflection

The NCCE encourages critically reflective practice in all areas of academic work, including teaching and curriculum development. All the feedback teacher can obtain from other sources is, of course, of little use unless there is a reflective and critical approach to personal practice. In addition, for summative purposes such as promotion, it's important for the teacher to be able to demonstrate, through examples and accounts of practice, that you have reflected on, and acted constructively in response to, formative feedback and evaluation. Self-reflection methods, activities and resources.

Student assessment tasks and attainment of learning outcomes

The assessment tasks and other work that computer science students produce in the course of their study is a valuable source of information about one's teaching and curriculum design. There are many ways to use students' work in both self- and peer-evaluation, for purposes such as developing teaching skills, refining curriculum, diagnosing problem areas and providing evidence of effective teaching of computer education in the teacher training programme in Nigeria. Using student work in evaluating teaching and curriculum.

2.7 Empirical Studies

Numbers of researches were conducted on implementation of curriculum both at Nigeria and other countries of the world. The essence behind all this researches is to examine the state of curriculum implementation in institution of learning.

Solomon (2014) carries out a research on the topic "Factors Militating against the Implementation of Computer Education in Secondary Schools in Ondo State South West Nigeria". The major objectives of the study include: To examine availability of computer

resources in the schools, availability of man power to teach the subject in schools and the attitude of the school community towards the teaching and learning of computers in schools. The research question used in the study includes; are the computer services available in the schools? Do you have trained man power to teach the subject? And what is the attitude of the school community towards the teaching and learning of computers in schools.

The researcher used description survey design; the population of the study comprised all the teachers and principals of the secondary schools in Ondo state. The sample of the study is made up of 500 teachers randomly selected from 50 secondary schools in the state. A self-designed questionnaire tagged “computer education for secondary schools (CESS) was used to collect data by the researcher. Simple percentage statistic was used to analyze the data collected. The findings of the research revealed that; the majority of the school have no computer accessories in their laboratory and those with computers are not functioning well and not even adequate, there were no enough teachers to teach computers, and the teachers were qualified and not willing to teach computers as a subject in schools-because of their illiteracy of using computer education implementation in schools. Also majority of the principals, teacher’s parents and stake holders have positive attitude towards computer education.

The researcher also recommended that: - Government should provide enough funds for schools to purchase computer resources and make available suitable environment in the secondary schools and curriculum developers should make computer education one of the core subject to be offered in secondary schools. The previous work is related to the current study in the area of examining the availability of computer facilities and man power for the implementation of computer education. This work also differs from the previous study in term of level of education because the present study is carried out in the state colleges of education and the previous is carried out at secondary schools.

Chukwuka (2013), conducted a research on the topic “computer education – problems of teaching in secondary schools in Enugu (A case study of Nsukka L.G.A.)” the major objectives of the study include; to study the problems hindering the teaching of computer education, suggest an effective of carrying out computers instruction in the area under the study, proffer solution to the hindrances identified. The research questions of the study are: what are the factors hindering effective teaching of computer science in secondary schools? What are the constraints in teaching computer science education in secondary schools? What are the necessary solutions in teaching computer science or how can this problem be solved?

The type of research used was survey design. Population of the study consisted of all SS3 students in secondary schools in Nsukka local government of Enugu state. Total number of student at the time of the study was 3,600 in 20 schools. From which 120 students from each school were selected. The instrument used to collect data in the study was questionnaire. The major findings includes: lack of fund, trained personal and negative attitude of school authority are among the factors hindering teaching of computer education in secondary schools. The researcher found out that unavailability of computer and it accessories, non-inclusion of computer science as compulsory subject in the present philosophy of education and lack of infrastructural facilities are equally constraints to teaching computer science. The researcher discovered that provision of enough fund, training teachers that specialize in computer science and making computer education in Nsukka local government are among the solution to problems of teaching computer science in the area under the study. Major recommendations of the study include: in the study, fund is a big hindrance to teaching of computer science education. The researcher therefore recommends that Nsukka local government area and the state government should give education priority attention in its annual budget. Educational administrators and stake holders in education should consider a revisit of the present curriculum of education. Effort should be made to encourage training of teacher that will specialize in computer science

education. The current research has some similarities in terms of instrument used for data collection which is questionnaire, both findings also reveals in adequacy of man power for the implementation of computer science education. The major difference is that the current study tested the null hypotheses concluded using descriptive statistics.

Odera (2010) carried out a research on the topic “Emerging issues in the implementation of computer technology into Kenyan secondary school classrooms. The objectives of the study are: to find out the factors affecting use of computer in schools, to find out the rate of the teacher training in the use of computers in the area of study, teachers attitude towards the use of computers in teaching. The research questions of the study include: what are the factors affecting the use of computer in Kenyan secondary school classroom, to extent does teachers train and use computer in the classroom, what is the attitude of teachers towards the use of computers in teaching-learning process. A survey design was used as the type of the study.

The population of the study comprised 500 secondary schools in Nyanza province of Tanzania with 80 computer teachers in girls and boys as well as mixed secondary schools. The instruments used for data collection are “semi structured interview”, questionnaire and observation. Simple percentage rate was used as technique of data analysis. Finding of the study revealed that: the major issues and problems that prevented the use of computers in the classroom were: lack of adequate training in computer skills, not enough time of for teachers and students to use computer effectively, lack of confidence and skills with computers, difficulties of access to the computers and soft, lack of enough computers for student to use effectively and the issue of computer support materials and technical assistance. The researcher recommended that: for computer to use effectively in schools, the existing teacher training courses need to be built around developing teachers’ personal skills in computer utilization. Adequate of funding can give teachers both the opportunity and time to practice, learn and assess the quality of programmes for use in teaching and learning. The previous research is related to the current

one in terms of examining the process of implementing computer education in schools, also the design used were the same as descriptive survey design, whereas they differ in terms of instrument and procedure for data analysis.

Farouk (2005) conducted a research on the topic "implementation of computer education programme in Kano science and technical colleges". The objectives of the study include: to find out whether there is a well-designed curriculum for teaching computer education in the schools, to find out whether there is adequate manpower to teach computer education in schools, to find out whether there are adequate facilities or equipment to implement computer education in the schools. The study has the following research questions: does each of the schools have a well-designed curriculum for teaching computer education in the school? is there an adequate and competent number of teachers to teach computer education in the schools?, are there adequate facilities and equipment for implementing computer education programme in the schools?. Descriptive research design was used.

The population of the study comprised of all the staff of Kano state science and technical colleges. A sample of 5 schools out of 10 in the state was randomly selected. The instrument used is questionnaire. The data was tabulated and analyzed using simple percentage statistical technique. The findings of the research include: there is no designed curriculum for teaching computer education in Kano science and technical colleges, there was only a drafted so-called curriculum designed by the board and the content was other-headed with much emphasis on cognitive domains. The results also indicated that all the computer teachers found in the schools were only trained with requisite skills to teach computer education. Findings also reveal that there was a shortage of computer facilities; funds are not available for the maintenance of computers and procurements of new ones. There are few text books found in the school libraries and the data clearly shows the programme started without adequate and relevant text books in computer education. Some of the major recommendations of the study are: there need to design a computer

education curriculum, which reflects our needs, interest norms values and attitudes, there is need for manpower to implement the programme that satisfy all the conditions of the national policy on education. Federal government should review the present policy of funding education and re-examine the strategies for achieving the objectives of secondary schools education and provide all the necessary facilities of training computer teachers in tertiary institutions. The previous research has close relation with current study in term of objectives, and research question while differs in terms of analysis and level of the study.

Owolabi and Jegede, (2003) carried a research on the topic “Computer Education in Nigerian Secondary Schools Gaps between Policy and Practice”. The major objectives of the study are: to find out the extent to which the national computer policy objectives been achieved in schools, whether there is provision of availability hardware in schools with policy dictates, find out whether there are available and competent teachers compared to policy expectations. The research questions of the study include: to what extent have the policy objectives been achieved in schools? How available and competent are the teachers compared to policy expectations?, how congruent is the hardware provision in schools with policy dictates?.

The type of research used in the study was survey designed. Information was collected from 20 federal unity secondary schools (10 public, 10 private schools located in six different states in Nigeria. Questionnaire was used as instrument for the collection of data. Simple percentage technique was used as technique for data analysis. The study reveals that wide gaps existed between policy and practice in teaching computer education in the federal unity secondary schools in Nigeria due to the following reasons: the teaching of computer education in the federal government school is limited to JSS levels only, however very few private schools offered it at these level.

Computer per school policy is not the reality in the schools. The accepted computer class number in schools is 40 according to the policy, but public schools greatly exceed this number with an

average class membership of almost 50. Thus at the study period the current case in public schools is far from the policy stipulation, hence majority of the computers in schools are out dated and most of the teachers have no teaching qualification, whereas the computer with education graduates are mainly: those that have an education degree in other subject areas such as mathematics, physics, physic education, mathematics education, economic and geography. Public school computers were hardly ever maintaining while the observed private schools reported 100% regular maintenance. Also some time the maintenance was reported by public schools, that teachers were the ones who carried out these repairs. The major recommendations of the study are: to bridge the gap both policy and practice need to be implemented, government should fund the programme to provides available computers in schools, the current policy need to be updated within the dynamic world of computers, regular in service training for teachers must be in place that includes basic computer operations, programming & teaching methodologies. The only similarity between the previous and the current study is process of computer education and instrument used, whereas the former limited to policy and practice of computer education and the later deals with general implementation and practice of education. Similarly, Adefunke, Ayodele and Olufemi (2014) assess the implementation of national computer education curriculum in Nigeria primary schools. Data were collected by means of 4 points Likert Scale questionnaire from 200 primary school computer teachers (116 males and 84 females) in 12 local government areas in Oyo state, Nigeria. Cronbach's alpha internal consistency coefficient of the Computer Education Curriculum Implementation Questionnaire (CECIQ) was 0.86. Descriptive statistics and t-test were used for analyzing data. The results revealed that there was no significant difference in the level of awareness of computer education curriculum by the private and public computer education teachers. Similarly, the result also revealed that there was no significant difference in the computer competence of male and female teachers in Nigeria primary schools. However, there was significant difference in the availability

of computer hardware and software in the public and private schools. The study discusses the findings and makes some recommendations.

In the same vein, Jegede and Owolabi compares Nigeria National Computer Policy (1988) with existing school practice. Policy dictates for computer hardware, maintenance and funding, teaching personnel and training, and computer curriculum were compared. Information was collected from 20 secondary schools (10 public and 10 private) located in six different states in Nigeria through a questionnaire and interviews of teachers and students were analyzed using descriptive statistics. Comparisons of existing schools' situations revealed that wide gaps existed.

In another development, Aboderin and Solomon (2014) investigate the factors militating against the implementation of computer education in secondary schools in Ondo State South West, Nigeria. The study investigates availability of computer resources in the schools, the budgetary and funding of computer education in schools, availability of trained manpower in teaching computer education in schools, the attitude of the school community towards the teaching and learning of computers in schools, adequacy of time for computer lessons on the timetable and Remedies to ensure computer education is fully implemented in schools. The descriptive survey design was used for the study. The population consisted of all the teachers and principals of the secondary schools in Ondo State. The sample consists of 500 teachers and 50 principals randomly selected from 50 secondary schools in Ondo States. A self-designed questionnaire tagged "Computer Education for Secondary Schools (CESS)" was used to collect the data for the study. Data collected for the study were analyzed using frequency counts, percentage scores and bars. The study revealed that computer resources were lacking in schools. Moreover, the study revealed that budgetary and funding constraints militating against computer education in schools; there is lack of trained manpower in teaching computer education in schools; the school

community show positive attitude towards the teaching and learning of computers in schools; there is no adequacy of time for the computer lessons on the timetable.

The study also reveals some remedies that can be put in place to make sure computer education is fully implemented in schools: school authority should source for funds and computers from well-wishers: Government to provide funding to schools for computer procurement; Invigorating the training of manpower to teach computers in schools; Teacher education institutions to incorporate computer education into their curriculum; Government to make it compulsory for schools to offer computer education; There should be regular in-service training for computer education. It was therefore recommended that government should increase the funding of the education sector. There should also be periodic training for teachers on computer skills acquisition.

Moreover, Eberendu (2014) work is carried out to reveal those issues that have been hindering the full implementation of ICT in Nigerian secondary school curriculum. Survey was carried out in sampled 12 states of the Federation on 156 secondary schools to address those issues relating to infrastructure, curriculum implementation, and staff training. The questionnaires were administered to principals, head teachers or ICT coordinators to find out those issues hindering the effectively implementation of ICT in secondary schools. The result of the findings revealed that 84 (53.8%) of respondents have appointed ICT coordinator while 72 (46.2%) have none showing lack of preparedness for the implementation of the policy. The study recommends continuous professional development for all teaching staff to make integration of ICT in the secondary school curriculum a success. The study is related with the previous one in term of facilities and the design whereby it differs in terms of analysis and level of the participants of the study.

2.8 Summary

This research is designed to assess the entire process and extend of implementing the computer education programme in Kano and Jigawa state colleges of education. A variety of literature related to the implementation of computer education programme was presented. The chapter also reveals some scholars and researchers work of which mostly focused on the issues, process and methods use in implementing computer education in particular and curriculum implementation in general. However, most of the reviewed literature was limited to the secondary school level of education, neglecting computer education programme in higher institutions like colleges of education in which this study addressed to.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter centers on the procedure used in conducting this research. The chapter described the research design, population of the study, sample size and sampling techniques, data collection instruments, validity and reliability of the instrument, data collection procedure as well as data analysis techniques.

3.2 Research Design

Descriptive survey design was used in this study. According to Orodho(2003) descriptive survey design allows a researcher to gather information, summarize, present and interpret for the purpose of clarification. It is a method that helps in collecting information by interviewing or using questionnaire to a sample of individuals. The finding of the descriptive survey can be generalized (Bichi, 2004). The study uses purposive sampling technique because the respondents were at the best position in knowledge and experience to provide the needed information.

3.3 Population

The population for this study comprises all academic staff and NCE students of Computer Science Education (CSE) departments in Kano and Jigawa states Colleges of Education. There are one thousand five hundred and ten (1,510) students and fifty-eight (58) teachers in Computer Science Education departments in Kano and Jigawa States Colleges of Education. The table below shows the population distribution of students and teachers of Computer Science Education departments by institutions.

Table 3.1: Population Distribution of Teachers and Students of Computer Science Education Departments

S/N	Colleges	Students	Teachers	Total
1	Sa'adatu Rimi College of Education, Kano	840	31	871
2	Jigawa State College of Education, Gumel	670	27	697
	Total	1510	58	1,568

(Source: Planning and statistics departments of the Colleges 2015)

3.4 Sample and Sampling Technique

The sample size for this study is 306 comprising students and teachers. This is based on recommendation of Morgan and Krejcie (1970) which states that for population of 1568, a sample of 306 were recommended respectively. Samples were drawn from two Colleges of Education in Kano and Jigawa States. The sampling technique used was purposive sampling technique. Purposive sampling is a sampling technique that enables the researchers to make judgment on the suitability and appropriateness of any selected sample considering its peculiarities (Ekeh, 2003).

Table 3.2: Sample of the study showing number of sample by Colleges and Gender

S/n	Colleges	Students		Teachers		Total
		Male	Female	Male	Female	
1	Sa'adatu Rimi College of Education, Kano	93	50	15	05	163
2	Jigawa State College of Education, Gumel	80	42	16	05	143
	Total	173	92	31	10	306

3.5 Instrumentation

The research instruments used for data collection in this research work was questionnaire.

According to Anthony (2006) questionnaire is used in survey design research for some advantages: reduction in biasing error, greater anonymity, considered answer, consultation including accessibility and low cost. The questionnaire used for this study was closed ended

modified Likert type and is called “Implementation of Computer Science Education questionnaire (ICSEQ)”. To attain the objectives of the study, the questionnaire was divided into sections with each section containing statements aimed at attaining a particular objective set by the study.

The questionnaire is designed based on modified Likert four point scale in which respondents are required to respond to each item in terms of degrees of agreement and disagreement. The respondents are expected to react to each item on a four point scale ranging from Strongly Agree (SA) 4, Agree (A) 3, Disagree (D) 2, and Strongly Disagree (SD) 1 respectively. The questionnaire items were 34 designed in sections to answer individual objectives.

3.5.1 Validity of the instrument

In order to ascertain the validity of the instrument for this study, the questionnaire was given to research supervisors to ascertain its content and construct validity. Experts in Curriculum and Instruction Section of Ahmadu Bello University, Zaria assisted in that regard. The questionnaire items were subjected to thorough scrutiny to ensure the validity of the instrument.

3.5.2 Pilot Study

Pilot study was conducted by the researcher in order to identify questions that respondents might find it difficult to respond to, and also to help remove ambiguous and embarrassing options to the respondents. The pilot study of this research was conducted at federal college of education, Kano using forty (40) respondents consisting of thirty (30) students and ten (10) lecturers. Forty (40) questionnaires were distributed, whereby thirty seven (37) were retrieved successfully. The data obtained were subjected to further statistical analysis using Cronbach’s alpha formula for determining reliability co-efficient.

3.5.3 Reliability of the Instrument

The data collected from the pilot study were subjected to reliability test in order to determine the reliability, stability, and the consistency of the instrument for this study. The Cronbach's Alpha formula for calculating reliability co-efficient was used to analyze the responses of the respondents. Consequently reliability coefficient of 0.799 was realized. This reliability co-efficient is considered adequate for the internal consistencies of the instrument. According to Maiwada (2005) a tool is reliable if its reliability is 0.64 and the closer to 1 the more reliable the instrument. This therefore confirms the reliability of the data collection instrument used as fit for the main work.

3.6 DataCollection Procedure

The researcher received a letter of introduction from the Department of Educational Foundation and Curriculum, Faculty of Education,Ahmadu Bello University, Zaria. This enabled the researcher to obtain official data needed for the study from the Colleges of Education in the study area. Further, the letters of introduction were forwarded to the Colleges under the study sample. This is aimed at introducing the researcher and the study motives and also as a means of soliciting for official permission and co-operation to utilize teachers and students for the study.

The researcher distributed the questionnaires to the teachers and students of Kano and Jigawa states Colleges of Education to respond. The researcher was assisted by two research assistants; an experts in education research who are trained in two days. However, 265 questionnaires were retrieved from the students and 41 from the teachers at the end of the exercise.

3.7 Procedure for Data Analysis

The data for the study were the responses from questionnaires distributed to teachers and students in the study area. The study's research questions were answered using frequency count and simple percentage.However, chi-square was used in testing the research hypotheses. All hypotheses were tested at0.05 level of significance.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the data analysis including its discussion of results. The data was collected from teachers and students on the implementation of Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa states, Nigeria. A total of 265 students and 41 teachers clearly responded to the instrument. The analysis of the data collected was done using both descriptive and inferential statistics.

4.2 Data Analysis

The data collected and analyzed was presented in two ways. In the first instance the study answered the research questions with descriptive statistics and finally the hypotheses were tested using the chi-square statistical analysis.

4.2.1 Answering Research Questions

Presented below are answers to research questions raised by the study. The frequency counts and percentage are used to analyse the data.

Research Question One: To what extent are laboratory facilities and equipment adequately provided for the implementation of Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa States?

The above research question was responded by the subjects using frequency count and percentage. The statistical data in the table below explains the responses of the subjects.

Table 4.1: Respondents Frequency on the Adequacy of Laboratory Facilities and Equipment for the Implementation of the CSE

Respondents	Agreed	Percentage	Disagreed	Percentage
Teacher	4	9.78%	37	90.25%
Students	33	14.23%	232	87.47%

Table 4.1 above presents the respondents frequencies and the percentages on the teachers and students opinion on the adequacy of the laboratory facilities and equipment for the

implementation of CSE curriculum in Kano and Jigawa Colleges of Education. It can be seen that 90.25% and 87.47% of the teachers and students believed that the laboratory facilities and equipment for the implementation of the CSE in the study are inadequate.

Research Question Two: What is the extent of the Provision of Adequate Manpower for the Implementation of Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa States?

This research question was responded by the subjects using frequency count and percentage. The statistical data in the table below explains the responses of the subjects.

Table 4.2: Respondents frequencies on the provision of adequate manpower for the Implementation of CSE at College of Education in Kano and Jigawa States

Respondents	Agree	Percentage	Disagree	Percentage
Teacher	5	12.20%	36	87.80%
Students	216	81.51%	49	18.49%

The frequencies of the teachers and students opinion can be seen in table 4.2 on the provision of adequate manpower for the implementation of CSE at colleges of education in the study area. The table shows a divergence in the teachers and students opinion. As 87.9% of the teachers argued inadequacy on the provision of manpower to implement CSE, however, 81.51% the student hold the opinion that there is adequate manpower.

Research Question Three: To what degree are funds adequate for the implementation of Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa states?

This research question was responded by the subjects using frequency count and percentage. The statistical data in the table below explains the responses of the subjects.

Table 4.3: Respondents Frequencies on the Adequacy of Funds for the Implementation of CSE at Colleges of Education in Kano and Jigawa States

Respondents	Agree	Percentage	Disagree	Percentage
-------------	-------	------------	----------	------------

Teacher	12	29.27%	29	70.75%
Students	188	70.94%	77	29.06%

Reading between the lines in Table 4.3, one can understand that the teachers and students hold different opinion with regards to the fund provision for the implementation of CSE in the study area. When 70.73% of the teachers disagreed with provision of adequate funds, 70.94% of the students were with the notion that there is adequate provision of required fund to implement the CSE at Colleges of Education Kano and Jigawa

Research Question Four: What are the methodological approaches adopted for the implementation of Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa states?

The above research question was responded by the subjects using frequency count and percentage. The statistical data in the table below explains the responses of the subjects.

Table 4.4: Respondents Frequencies on the Method Employed for the Implementation of CSE

Respondents	Agreed	Percentage	Disagreed	Percentage
Teacher	36	87.80%	5	12.20%
Students	67	25.28%	198	74.72%

It can be seen from Table 4.4 above that 87.80% of the teachers believed that methodologies employed in implementing the CSE curriculum agreed to be the right methods. While 74.72% of the teachers believed on the opinion that the methodologies were inappropriate.

4.2.2 Hypotheses testing

All of the hypotheses of the study were tested using chi-square statistics at 0.05 level of significantas it can be seen from the following tables below.

Hypothesis 1: There is no significant difference between teachers and students’ opinion on the adequacy of laboratory facilities and equipment for implementation of CSE in colleges of education in Kano and Jigawa states.

Table 4.5: Chi-square Result on the Teachers and Student opinion on the Adequacy of Laboratory Facilities and Equipment for the Implementation of CSE.

N	X ² - Cal.	X ² - Crit.	p-value	Decision
306	0.002	3.841	0.968	Retained H ₀

Significance level at 0.05

Table4.5 shows that x²cal is 0.002 which is less than x²crit 3.841 (cal 0.002 < crit. 3.841) indicating no differences between the teachers and students view on the inadequacy of the laboratory facilities and equipment of the CSE which means the H₀ status that there is no significant differences between the teachers and students opinion on the adequacy of laboratory facilities and equipment is retained.

Hypothesis 2: There is no significant difference between teachers students opinion on the provision of adequacy manpower for the implementation of CSE at College of Education in Kano and Jigawa states.

The above hypothesis was tested using chi-square statistics at 0.05 level of significantas it can beseen from the table below.

Table 4.6:Chi-square Result on the Teachers and Students opinion on the Provision of Adequate Manpower for the Implementation of CSE at College of Education in Kano and Jigawa States.

N	X ² - Cal.	X ² - Crit.	p-value	Decision
306	85.03	3.841	0.00	Rejected HO

Significance level at 0.05

The table 4.6 decision was to reject H_{02} as the calculate chi-square value is greater than the critical value ($x^2_{cal} 85.03 > crit.3.841$) indicating a significant differences between teachers and student opinion on the provision of adequate manpower for the implementation of CSE at colleges of education, Kano and Jigawa states.

Hypothesis 3: There is no significant difference between teachers' and students' opinion on the adequacy of funds for the implementation of CSE at colleges of Education in Kano and Jigawa States.

The above hypothesis was tested using chi-square statistics at 0.05 level of significantas it shows in the table below.

Table 4.7: Chi-square Result on the Adequacy of Fund for the Implementation of CSE at College of Education in Kano and Jigawa States.

N	X^2 - Cal.	X^2 - Crit.	p-value	Decision
306	27.24	3.841	0.00	Rejected H_0

Significance level at 0.05

The decision inTable 4.7 also rejected the null hypothesis which statesno significance different between the teachers' and students' opinion in the provision of adequate funds to implement CSE at Colleges of education Kano and Jigawa. As the x^2 -cal stood at 27.24 at 0.05 level of significant.

Hypothesis 4: There is no significant difference between teachers and students opinion on the method employed for the implementation of CSE at colleges of education in Kano and Jigawa States

The above hypothesis was tested using chi-square statistics at 0.05 level of significantas it shows in the table below.

Table 4.8: Chi-square Result on the Method Employed for the Implementation of CSE

N	X^2 - Cal.	X^2 - Crit.	p-value	Decision
306	62.156	3.841	0.000	Rejected H_0

Significance level at 0.05

The table 4.8 rejected the hypothesis that there is no significant difference between teachers and students on the methods employed for the implementation of CSE curriculum in Kano and Jigawa states Colleges of Education as $\text{Chi-Cal } 62.156 > \text{Crit. - value } 3.841$.

4.3 Summary of Major Findings

The major objective of this study is to assess the implementation of computer science education in Colleges of Education in Kano and Jigawa states. The Major findings of this research were summarized below:

1. There was no adequate provision of facilities and equipment to implement the computer science education in Colleges of Education in Kano and Jigawa states.
2. The funds provided were significantly inadequate for the implementation of Computer Science Education curriculum in colleges of Education in Kano and Jigawa States.
3. The manpower provided to implement the computer science education in colleges of education in Kano and Jigawa were significantly inadequate.
4. Finally teaching methodologies employed in the implementation of computer science education curriculum in colleges of education in Kano and Jigawa were significantly inappropriate.

4.4 Discussion of the findings

The focal point for this research work was assessment of the implementation of computer science education in colleges of education in Kano and Jigawa States. The study collected data on four major aspect of curriculum implementation viz: provision of adequate facilities and equipment, adequate funds, adequate manpower as well as employment of appropriate teaching methodologies.

From the data presented in tables 1 and 2 both the students and teachers agreed and believed that the necessary facilities and equipment needed to appropriately implement CSE curriculum had not been adequately provided as 90.25% and 87.47% the teachers and students from table

believed that the laboratory facilities and equipment for the implementation of the CSE curriculum in the study are inadequate. Meanwhile table shows that x^2_{cal} is 0.002 which is less than x^2_{crit} 3.841 ($cal\ 0.002 < crit.\ 3.451$). This findings is similar to the findings of Solomon (2014) who carried out a research on the topic “factors militating against the implementation of computer education in secondary schools in Ondo state south west Nigeria” and Chukwuka (2013) with a topic “computer education – problems of teaching in secondary schools in Enugu a case study of Nsukka L.G.A”. The research finding has shown in black and white that despite the intervention of agencies such as Tertiary Education Trust Fund (Tetfund) in many areas of the tertiary education, the provision of adequate facilities and equipment to implement the computer science education in Colleges of Education in Kano and Jigawa states is still inadequate.

Reading between the lines one can understand the divergence views between the teachers and students on the adequate provision of funds, manpower and employment of appropriate methodology. On the issue of funds and manpower the study believes with views of the teachers, as the teachers were believed to know more about the required funds and student-teacher ratio to implement CSE in colleges of education. As 87.9% of the teachers argued in adequacy on the provision of manpower to implement CSE curriculum, 81.51% the student hold the opinion that there are adequate manpower ($X^2_{cal}\ 85.03 > 3.841$) indicating a significant differences between teachers and student opinion on the provision of adequate manpower for the implementation of CSE curriculum at colleges of education, Kano and Jigawa state.

On the other hand students are believed to be in the best position to assess the methodology employed by teacher. In this line, the students opinion was uphold by the research. It can be seen from table 7 above that 87.80% of the teachers believed that methodologies employed in implementing the CSE curriculum agreed to be the right methods. While 74.72% of the teachers believed on the opinion that the methodologies were inappropriate.

The finding of this research on the funds, manpower and methodologies were in line with the findings of Farouk (2005) who conducted a research on the topic “implementation of computer education programme in Kano science and technical colleges, Owolabi and Jegede, (2003) carried a research on the topic “computer education in Nigerian secondary schools gaps between policy and practice and Adefunke, Ayodele and Olufemi (2014) assessed the implementation of national computer education curriculum in Nigeria primary schools. The results from all these researches indicated that all the computer teachers found in the school were only train with requisite skills to teach computer education. Findings also reveal that there was shortage of computer facilities, funds is not available for the maintenance of computers and procurements of new ones.

National Policy on Education (2004) has clearly explain that Nigeria cannot afford to ignore the role which computer literacy plays in achieving the national goals of technological development considering the fact that, educational system around the world face formidable challenges that taxing conventional strategies. Fresh approaches are needed to address persistent problems of the past and provide student with an education relevant to the needs of the modern information based global economy.

Hence Nigeria has resolved to introduce computer education in primary and secondary schools, there is need to produce professional teachers in the discipline. Although, there has been provision for the training of computers scientist in the universities and polytechnics, but little attention was paid to the training of teachers in the computer education (NCCE, 2012).

However, it was stated clearly in the NCCE (2012) guidelines that, computer education curriculum are meant to achieve objectives as: To teach computer studies at primary and school levels; write computer programme and process data with maximum speed and accuracy, demonstrate reasonably high level of competence in the preparation for further studies in computer science education, motivate pupils interest in the study of computers by appropriate

using ICT Teaching –learning strategies and apply the use of computer as an aid in daily life activities.

In light of the findings of this research viz: inadequate facilities and equipment, inadequate manpower and funds as well as inappropriate methodologies, the stated objectives of NPE (2004) and NCCE (2012) have long way to be achieved.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The study is titled “Assessment of the Implementation of Computer Science Education in Colleges of Education in Kano and Jigawa states, Nigeria. The study was guided by five objectives, five research questions and five hypotheses. However, the study used teachers and students in the Colleges of Education in the study area as sample. Furthermore, related empirical studies were reviewed, citing similarities and identifying differences with the current study. The review further identifies some of the gaps between the current study and other studies.

Moreover, survey research design was used. The study used purposive sampling technique to draw sample from the study sample. The study also used a questionnaire, interview schedule and observations as data collection instruments. The instruments were validated by supervisors and statisticians for content and face values. The study pilot tested the instrument and it was certified as statistically fit for the main work.

However, the study used simple percentage and frequency counts, as well as chi-square to test the study’s null hypotheses. The study retained the first null hypothesis of the research which stated a no significant difference between teachers and students’ opinion on the adequacy of laboratory facilities and equipment for implementation of the CSE in Kano and Jigawa but it rejected the other three null hypotheses which argued no significant differences between teachers and students’ opinion on the provision of adequate funds, manpower and the employment of the appropriate methodologies for implementation of the CSE in Kano and Jigawa.

5.2 Conclusion

This research work was meant to assess the implementation of computer science education in colleges of education in Kano and Jigawa States. The study collected data on four major aspect

of curriculum implementation viz: provision of adequate facilities and equipment, adequate funds, adequate manpower as well as employment appropriate teaching methodologies.

Education is the process through which individuals are made functional members of the society through transmission of knowledge, skills and attitude. Thus, education promotes better health increases skills and higher productivities, providing chances to live in dignity and make wise and rationale decision about one's life.

It should be clearly noticed that provision of available and recent computers is one of the basic requirements in the implementation of computer education programme in our educational institutions, apart from the employment of adequate and qualified personnel. Both teaching and non-teaching staff are equally important on the implementation of computer education program.

The findings of this research reveal inadequate provision of facilities and equipment, inadequate manpower and funds as well as inappropriate methodologies for the implementation of computer science education in colleges of education in Kano and Jigawa states. The research, therefore concluded that the required trained and qualified teacher who will teach at lower and upper basic levels of Nigerian educational system could not be produced as such the stated objectives of NPE (2004) and NCCE (2012) have long way to be achieved.

5.3 Recommendations

Based on the findings of the study, it is recommended as follows:

1. The stakeholders of education in collaboration with other agencies and non-governmental organization should come to the aid of computer education by procuring adequate facilities and equipment in these states (Kano & Jigawa).
2. Kano and Jigawa States government should consider the possibilities of establishing the educational trust fund similar to that of TETFUND at States level to support computer education in their colleges of education. This will intensify the government effort towards the financing of tertiary education across the states.

3. To provide sufficient manpower that would be entrusted with the responsibility of implementing computer science education in colleges of education at Kano & Jigawa state; the governments of these states should sponsor these that excelled in this area to further their studies either at home or abroad to come and conduct a step down training to others.
4. Teachers at colleges of education at these states, (Kano & Jigawa) should abreast themselves with new methodologies of implementing curriculum through today's teaching and learning situation, pragmatic teaching is more appropriate to any situation. Pragmatic teaching also is so topical to paradigm shift.

5.4 Suggestions for Further Studies

The study covers only Colleges of Education in Kano and Jigawa State it is therefore, suggested for further study to cover other Colleges of Education in another states of Nigeria. The study was also suggested for further studies such as:-

- 1) Extend the study to cover the colleges of education in North-West region, Nigeria.
- 2) The study may also be extend to teachers attitude towards proper implementation of computer science education
- 3) The study may also be conducted in both states and federal universities of Nigeria.

5.5 Contribution to Knowledge

Since this study found that there are no adequate laboratory facilities, man power, funds and appropriatemethodologies for the implementation of computer science education in colleges of education in Kano and Jigawa states. This will assist and guide the Kano and Jigawa states government, National Commission for Colleges of Education and the society to use the recommendations of the study in order to improve the level of the education by providing the adequate affirmation points for the achievement of the stated educational goals and objectives.

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APPENDIX A

AHMADU BELLO UNIVERSITY, ZARIA

DEPARTMENT OF EDUCATIONAL FOUNDATION AND CURRICULUM STUDIES

The Head of Department

SEEKING FOR PERMISSION TO CONDUCT RESEARCH WORK

I am postgraduate student of the above named University and I am conducting a research work on Assessment of the Implementation of Computer Science Education in Colleges of Education in Kano and Jigawa states. I will appreciate your kind support in undertaking this work to collect data for both teachers and students. The data collected will be used for academic purpose only and all information supplied shall be treated confidentially and for academic purpose only.

Best regards

Idris ISYAKU

APPENDIX B

Department of Educational Foundations and
Curriculum, Faculty of Education Ahmadu Bello
University Zaria

Dear respondent,

The researcher is an M.Ed Student of the above named Institution carrying out a research work on the “assessment of the implementation of computer education programme in colleges of education in Kano and Jigawa states, Nigeria.

The questionnaire items are designed to elicit the right type of response based on your own objective opinion. The reliability of the study depends on your sincerity and solemn judgment.

Thanking in anticipation for your favourable response.

Yours sincerely,

Idris Isyaku

MED/EDUC/2172/ 2011-2012

Section (A) Bio Data

Instruction: Please tick as appropriate [✓] in the columns provided below

1) Name of college

2) Status

a) Teacher b) Student

Section (B)

S/N	Adequacy of Laboratory Facilities for CSE Implementation	SA	A	D	SD
1	Availability of alternative source of power supply				
2	There is functional air conditioning in the laboratory				
3	There is no enough space in computer laboratory				
4	There is availability of suitable software for computer education applications				
5	There is in adequate of infrastructural facilities like electricity				
6	There are un-availability of computers and its accessories				
7	Availability of functional internet connectivity				
8	Availability of classrooms				
9	Availability of computer laboratory				
10	Availability of audio-visual aids				
11	Audio materials				
12	Availability of printed materials				
13	Audio materials				
14	Availability of projectors				
	Adequacy of Manpower for CSE Implementation	SA	A	D	SD
15	There is the availability of well-motivated teachers				
16	There are laboratory technicians				
17	Availability of laboratory cleaners				
18	There are equipment maintenance workers				
	Provision of Funds for the Implementation of CSE	SA	A	D	SD
19	Sufficient funds are provided for the procurement of facilities				
20	Sufficient funds are available for maintenance and upgrade				
21	Funds are allocated for students field works				
22	Funds are set aside for teachers seminars and workshops				
23	Funds are allocated for students' SIWES allowances				
24	There are adequate funds set aside to fuel stand by generators				
25	Available funds are provided for the procurement of computers				
26	Funds are set aside for staff development programmes				

	Methodological Approaches for CSE Implementation	SA	A	D	SD
27	Practical demonstration is used in CSE implementation				
28	Lecture method is used in CSE implementation				
29	Resource places and field-based experiences is used in CSE implementation				
30	Seminar and tutorials are used in CSE implementation				
31	Supervised Projects are used in CSE implementation				
32	Students' guided practice is used in CSE implementation				
33	Problem solving/ inquiry methods are used in CSE implementation				
34	Computer aided instruction is used in CSE implementation				

APPENDIX C

TABLE FOR DETERMINING SAMPLE SIZE FROM A GIVEN POPULATION

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Krejcie& Morgan (1970)

Note: “N” is population size

“S” is sample size

APPENDIX D

Reliability

Scale: ALL VARIABLES

Case Processing Summary

		N	%
	Valid	37	100.0
Cases	Excluded ^a	0	.0
	Total	37	100.0

Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.799	.797	34

Item Statistics	Mean	Std. Deviation	N
Adequacy of Laboratory Facilities for CSE Implementation	3.2432	1.03831	37
Availability of alternative source of power supply	3.1622	1.04119	37
There is functional air conditioning in the laboratory	3.1351	1.18233	37
There is no enough space in computer laboratory	3.4054	.89627	37
There is availability of suitable software for computer education applications	3.1081	.80911	37
5. There is in adequate of infrastructural facilities like electricity	3.0000	.97183	37
6. There are un-availability of computers and its accessories	3.1081	1.04838	37
Availability of functional internet connectivity	3.0541	1.05267	37
Adequacy of Manpower for CSE Implementation	3.1622	.98639	37
There is the availability of well-motivated teachers	3.9189	.49320	37
There are laboratory technicians	3.9730	.16440	37
Availability of laboratory cleaners	3.7027	81189	37
There are equipment maintenance workers	3.2162	1.03105	37
Provision of Funds for the Implementation of CSE	3.3784	1.11433	37
Sufficient funds are provided for the procurement of facilities	3.4324	.89878	37
Sufficient funds are available for maintenance and upgrade	3.1081	80911	37
Funds are allocated for students field works	3.0270	98563	37
Funds are set aside for teachers seminars and workshops	3.1081	1.04838	37
Funds are allocated for students' SIWES allowances	3.0811	1.06402	37
There are adequate funds set aside to fuel stand by generators	3.1892	96718	37
Available funds are provided for the procurement of computers	3.5676	.92917	37
Funds are set aside for staff development programmes	3.2703	.90212	37
Methodological Approaches for CSE Implementation	3.2703	.87078	37
Practical demonstration is used in CSE implementation	3.0541	1.15340	37
Lecture method is used in CSE implementation	3.2703	.90212	37
Resource places and field-based experiences is used in CSE implementation	3.5676	.92917	37
Seminar and tutorials are used in CSE implementation	3.2703	.90212	37
Supervised Projects are used in CSE implementation	3.1892	.96718	37

Students' guided practice is used in CSE implementation	2.7568	1.06472	37
Problem solving/ inquiry methods are used in CSE implementation	3.2703	.90212	37
Computer aided instruction is used in CSE implementation	3.1892	.96718	37

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.267	2.757	3.973	1.216	1.441	.070	34