EFFECT OF E-LEARNING ON STUDENTS' ACADEMIC ACHIEVEMENT IN MATHEMATICS IN SENIOR SECONDARY SCHOOL IN SOME SELECTED SECONDARY SCHOOL IN METROPOLIS

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ABSTRACT

This study is concerned with “Effect of e-learning on students’ academic achievement in Mathematics in senior secondary school in some selected secondary school in Metropolis”. The design employed was a simple experimental designed, while the population for this research study consist of all senior secondary school student in both bosso and chanchage local government of Niger State, and the sample of the study was made up of 393 out of 21792 student of senior secondary school (SS II) from the two selected randomly for this research. Two hypothesis were formulated and tested. The result showed that there is no significant difference between the two group (Control and experimental) on academic achievement, there was no difference between score of male and female student in the experimental class. It was therefore recommended that Government should establish ICT Orientation and training for the teachers in order to use it for teaching.

CHAPTER ONE

INTRODUCTION

1.0 Background of the Study

The inclusion of mathematics in the senior secondary school curriculum and the educational achievement of mathematics are connected with the various roles that mathematics as a subject play in improving science and technology. Mathematics as a subject has remained mysteriously difficult and unpopular for most students. This is despite the fact that no one is in doubt of its importance in almost all careers, especially in the science and technological fields. Many studies have found attitude to be one of the stumbling block for progress or otherwise in learning mathematics (Aiken, 1976). Technology has had a significant effect on the education system for many years. Earlier, computer in education concentrated on individual instruction involving computer assisted instruction. The recent developments in educational technology call for a more holistic and integrated model and approach to the educational process. The new technologies have brought about changes in pedagogy and curriculum content and have been instrumented in increased academic productivity and teaching effectiveness.

E-learning is referring to the use of new technologies in the service of learning and or learner support (Laurillard, 2006). It includes the delivery of content via the Internet, intranet, audio- and videotape, satellite broadcast, interactive TV and CD-ROM (Boon et al, 2005). E-learning technologies can be used in three main ways in universities and colleges: technology enhanced classroom teaching; distance education (in a bid to reach more students who cannot gain access to conventional universities); and distributed learning (a mix of deliberately reduced face to face teaching and online learning also called 'the mixed mode' or ' flexible learning'). Huffaker (2003) lamented the lack of proper integration of e-learning into the classroom situation in the traditional conventional learning scenarios advocating for the need to tap all the advantages of e-learning by entrenching into the school system as part of the curricular practice. E-learning has been defined in varieties of ways by different persons. Stockley (2006) defined

e-learning as the delivery of learning, training or educational programmes via electronic means using computer or other electronic devices to provide training, educational or learning materials. He mentioned that it can be by the use of internet or intranet, CD-ROM or DVD to provide learning materials. Wikipedia(2010) further elaborated on e-learning as all forms of electronically supported learning and teaching using information and communication system which may or may not be networked, comprising of computer and network-enabled transfer of skills and knowledge, which may be web-based, computer-based, virtual classroom and digital collaboration, delivered through internet, intranet/extranet, audio or video tapes, satellite TV, and CD-ROM, which can be self-paced or teacher-led embedded with media text, images, animation, streaming video and audio and associated with acronym such as CBT(computer-based training), IBT(internet based training) and WBT (web-based training).

Schmidt (2005) holds that e-learning consists of conventional training, such as courses, ad-hoc training, selected learning objects, formalization through document collections and community formation which can be achieved via social software. Also, Khan (2005) pointed that E-learning has been described in various ways as learning using a number of different technologies and methods for delivery e.g. Computer Based Training (CBT), Internet-based training (IBT), Web-based instruction (WBI), advanced distributed learning(ADL), distributed learning (DL), distance learning, online learning (OL), mobile learning (or m-learning) or remote learning and learning management systems (LMS).

The growth of e-learning programs according to Lockwood and Gooley, (2002) is driven by the need for and potential of providing education in less expensive ways, increased access to information, effective learning and greater flexibility. In E-learning system, students are able to interact anytime from wherever with different instructional material (text, sound, pictures, video and so on) through Internet. In addition, learners can communicate with teachers and

classmates both individually and as a group discussion with the use of message boards, instant message exchanges and video conferencing (Al-Ammari and Hamad, 2008).

Mathematics is the foundation of science and technology that have made our life more rapid, sophisticated and of comfort. Mathematics is used in a number of areas, because it provides a precise way to describe complicated situation and analyses difficult problems. That is why Kothari Commission (2006) rightly recommended the study of mathematics compulsory for all, for the first ten years of schooling. Mathematics has its roots deep in the soil of everyday life and is basic in our highest technological achievements. Even though almost everything of a concrete character is Mathematics, it is reputed to be and actually is the most abstract and the most hypothetical of sciences. In fact, Mathematics is a man-made science. It is the numerical and calculation part of man's life and knowledge. It helps the man to give exact interpretation to his ideas and conclusions. It deals with quantitative facts and relationships as well as with problems involving spaces and form. So the mathematic excellence of the student depends purely on teaching. The digital age guidelines stress clearly on the need to use new media for effective teaching. It has be noticed the higher secondary students have a lot difficulties in learning mathematical concepts. There is an urgent need to study and use the new technologies in mathematics.

For this, science and technology education is the primary target in which case tertiary education will come to the front. Mathematics, the fundamental tool for all sciences and technology is then the basic primary element which needs a very serious support during the teaching-learning process. This shows that the chain of interdependent relationships between development, technology, education, tertiary institutions, science and mathematics, in bringing the issue of the conceptual change in teaching and learning methodologies. This interdependent chain is cyclic such that education support the growth of technology, while in return, technological

facilities support educational system, in our case, the learning system, specifically by electronic support (e-learning).

1.2 Statement of The Problem

The current situation of Mathematics teaching and learning in Nigeria is a concern to all including government and the society at large. Research indicates that many students found Mathematics as a subject to be difficult, boring and not interesting to them (Salau, 2006). Jimma University is trying to reinforce the teaching-learning systems through the newly influential agent introducing online learning blended with the existing conventional system. From experience, it is that observed students and teachers seem very much interested towards ICT utility movement if it is not to be a seasonal fashion. The University is part of this motivated group initiating e-learning program at pilot level training for selected interested academic staff to deliver sampled courses from each college, where by in mathematics, fundamental concept of algebra course is the one selected under this project to exercise the e-learning blended learning activity. If this pilot exercise on e-learning support delivery is to be extended to a larger scale, it will be wise to grasp the opportunity to measure the rate of improvement made by the new agent infused for a better change. The assumption is the achievement of students will increase as we indulge electronic support which will create opportunities for students to learn independently constructing new knowledge through self-regulated learning. But, before expanding it beyond the pilot, it will be wise to ask, whether we really can get the intended improvement. If so, is the change of improvement is significant so that if we expand it we will get the return for the expensive cost we are to incur for the expensive technological equipment, online service, technical experts and the like. If so, not only will the quality of education improve but also it will add some new knowledge for theoretical understanding contribution (Mayer, 2003; Descamps, 2006, and Couco &

Goldenberg, 1996). Therefore, the study is also intended to answer the sub-questions indicated below:

1. Is there any influence of e-learning on academic performance of students? And what is the level of the influence?
2. What is the contribution of e-learning in the learning process?
3. What are the major challenges of e-learning supported learning in mathematics classes? Could there be possible solutions to alleviate these problems?
4. What is the level of access opportunity on electronic facilities in the campus to the students?

This study therefore deemed it necessary to look specifically into the effects of E-learning on students Achievement in mathematics in junior secondary school.

1.3 Aim and Objective of the study

The main purpose of the study is to examine the Effect of e-learning on students' academic achievement in Mathematics in some selected secondary school in niger Area. Specifically, the objectives of this study among others include the following;

i. To find out the availability of e-learning facilities for mathematics curriculum implementation in Secondary schools in minna.

ii. To find out the level of application and use of the available e-learning materials by mathematics teachers in Secondary schools.

iii. To find out the effect of e-learning facilities on academic performance of mathematics students in in Secondary schools in minna.

1.4 Research Questions

1. Will there be any significant difference in the mathematics achievement of the experimental group and the control group?

2. Will there be any significant difference between mean achievement scores of male and female students in the experiment group?

1.5 Research Hypothesis

Ho_1: There is no significant difference in the mean achievement scores of students in the experimental and those in the control.

Ho_2: There is no significant difference between mean achievement scores of male and female students in the experimental group.

1.6 Significance of The Study

The findings of this study will be of benefit to the students, teachers, government, curriculum planners and future researchers. The study will be of immense benefit to the students as its findings will enable them to know the importance and various applications of e-learning in the process of teaching and learning.

The use of computers by teachers in instructional delivery method will help students to develop skills and competencies in E-learning. The information that will be provided by the study on the ways in which computer can be used for instructional delivery will help teachers to upgrade their knowledge base in information and communication technology especially on how to use ICT in the planning, presentation and evaluation of instruction.

The application of e-learning facilities in the instructional process by the teachers; would also improve their competencies in the use of e-learning facilities and enhance their pedagogical practice. The lecturers would have opportunity to save time in instructional planning, delivery and evaluation. The findings of the study will increase the awareness of the lecturers on the importance of ICT in instructional delivery.

The study will be of benefit to the government. The findings of this study will guide the government in making result oriented ICT policies by enabling them to know the degree at which the teachers apply the e-learning facilities in their instructional process. Government will now mount appropriate programme' for training and retraining of teachers in the use of ICT for instructional planning, delivery and evaluation.

1.7 Scope of The Study

The study focused on the Effect of e-learning on students' academic achievement in Mathematics in senior secondary school in some selected secondary school in Metropolis. The study will cover the E-learning facilities, its application and Effect of e-learning on students' academic achievement in Mathematics. The study will be delimited to five secondary schools within Metropolis, Niger State.

1.6 Definition of Terms

The discoveries of this investigation will be of advantage to the understudies, instructors, government, educational program organizers and future scientists. The investigation will be of gigantic advantage to the understudies as its discoveries will empower them to know the significance and different uses of e-learning during the time spent educating and learning.

The utilization of PCs by instructors in instructional conveyance technique will assist understudies with developing aptitudes and capabilities in E-learning. The data that will be

given by the examination on the manners by which PC can be utilized for instructional conveyance will assist instructors with upgrading their insight base in data and correspondence innovation particularly on the best way to utilize ICT in the arranging, introduction and assessment of guidance.

The utilization of e-learning offices in the instructional procedure by the instructors; would likewise improve their abilities in the utilization of e-learning offices and upgrade their educational practice. The instructors would have chance to spare time in instructional arranging, conveyance and assessment. The discoveries of the investigation will build the consciousness of the instructors on the significance of ICT in instructional conveyance.

The investigation will be of advantage to the administration. The discoveries of this investigation will direct the legislature in making result situated ICT strategies by empowering them to know the degree at which the educators apply the e-learning offices in their instructional procedure. Government will currently mount proper program' for preparing and retraining of educators in the utilization of ICT for instructional arranging, conveyance and assessment.

1.7 Scope of The Study

The investigation concentrated on the Effect of e-learning on understudies' scholastic accomplishment in Mathematics in senior auxiliary school in some chose optional school in Metropolis. The examination will cover the E-learning offices, its application and Effect of e-learning on understudies' scholastic accomplishment in Mathematics. The examination will be delimited to five optional schools inside Metropolis, Niger State.

E-Learning: E-learning refers to electronic learning. This means using a computer to deliver part, or all of a course whether it is in a school or a full distance learning course.

Mathematics: refers the science of numbers and their operations, interrelations, combinations, generations, and abstractions and of space configurations and their structure, measurement, transformations and generalization.

Academic performance: This is regarded as the display of knowledge attained or skills, shown in the school subjects such achievements are indicated by test scores or by marks assigned by teachers. It is the school evaluation of students' classroom work as quantified on the basis of marks or grades

CHAPTER TWO

LITERATURE REVIEW

This chapter presents a review of related literature to the study the review has been presented under the following subheadings:

2.1 Conceptual framework

2.2 Theoretical framework

2.3 Empirical studies

2.1 Conceptual framework

2.1.1 Meaning and Concept of Mathematics

In the present country of ours "Nigeria", Industrial and Technology development are given a special concern (Adedeji, 2017). As a result students are equipped with innovative associated countries. Mathematics is one of the courses that traverse all the sciences. Now a day, mathematical processes perform a crucial responsibility in industrial development of any country and transfused literally every field of human endeavour. For our effort towards scientific and technological advancement to yield positive outcome, we need good achievement in mathematics at every school levels (Umoinyang, 1999).

According to Wikipedia (2010), Mathematics is essential in many fields, including natural science, engineering, medicine, finance, and the social sciences. Applied mathematics has led to entirely new mathematics disciplines, such as statistics and game theory. Mathematician engage in pure mathematics without having any application in mind, but practical application for what began as pure mathematics are often discovered later.

Mathematics is not only for science but also a very important tool for people that we use to solve the problems in our daily lives (Ozdamli, Dervis Karabey, Besime, Nizamoglu, 2012).

In Mathematics lesson student is needed to change the abstract concept into concrete concept and to understand while doing it. The role of the technology supported education here is to help student not only being able to concretize complicated abstract concepts but also to facilitate once again the configuration in student's mind through some known theorem graphics and multidimensional studies(Persico & Pozzi ,2011).Today, most of the scientific researchers have pointed out that m learning tools whether being in a programming way or teaching the topics in various effects (such as writing, voice, graphic) have been facilitating not only the comprehension of mathematical concepts but also increasing the motivation of student and the trust of himself/herself (Yenilmez, 2009).

Mathematics can evoke a variety of emotions, both positive and negative. For some, this can be a negative emotion that has a direct impact on decision-making and learning outcomes. Students with high levels of anxiety may have adverse physiological reactions to mathematics, going to extreme lengths to avoid mathematics altogether (Reed et al., 2010). Thus, math-anxious students may deeply feel that for them, learning mathematics is not possible. Instruction in a traditional face-to-face classroom can cause fear, anxiety, and avoidance of mathematics by some students (Tobias, 1981). Therefore, students with higher levels of mathematical anxiety may choose to learn mathematics online. At the 19th International Conference on Technology in Collegiate Mathematics, Spence (2007) reported that students chose an online course in order to avoid the physical face-to-face mathematical interactions that they find less favorable and uncomfortable. Although the sample size of Spence's study was relatively small, the implications of the results are worth noting and again suggest that future research is warranted.

2.1.2 Concept of E-leaning

E-learning (EL) is the use of Information and Communication Technology e.g. Internet, Computer, Mobile phone, Learning Management System (LMS), Televisions, Radios and others to enhance teaching and learning activities. E-learning is a unifying term used to describe the fields of online learning, web-based training and technology delivered instructions (Oye, Salleh, & Iahad, 2010). EL has become an increasingly popular learning approach in higher educational institutions due to vast growth of internet technology.

Nowadays E-learning has a competitive advantage and many universities have implemented it and this has impacts on students' performance. However, there are still other universities and academic institutions that use very low interactive E-learning which is not enough to contribute to the performance of the students. In contrary to that, other higher educational institutions use highly interactive E-learning which directly improves students' performance in general (Rodgers, 2008). Today technology is a tool used to remove geographical barriers and facilitates everybody to learn anytime and anywhere without the presence of the lecturer.

The main purpose of E-Learning is to increase accessibility of education and reducing costs and time as well as improving students' academic performance. This approach of learning facilitates different students at different continents to attend the same classes almost at the same time. Nowadays, technology is becoming the medium for teaching and learning without being at university campuses. This technology enabled instructional method is aimed to improve quality of education and student academic performance.

It has been found that students in higher educational institutions that engaged in E-Learning, generally performed better than those in face-to-face courses. (Holley, 2002) found that students who participate in online/ E-Learning achieve better grades than students who studied traditional approach. As result of this finding E- learning is growing very fast and become

popular and that is why many higher educational institutions are adopting to virtual learning system. E-Learning is widely used in many universities in the world today.

E-learning encompasses an ample array of systems, from students using e-mail and accessing course materials online while following a course on campus to programmes delivered entirely online. E-learning can be different types, a campus-based institution may be offering courses, but using E-learning tied to the Internet or other online network (Lorraine, 2007).

E-learning is an education via the Internet, network, or standalone computer. E-learning is basically the network enabled convey of skills and knowledge. E-learning refers to using electronic applications and processes to learn. E-learning applications and processes include Web-based learning, computer-based learning, virtual classrooms and digital collaboration. E-Learning is when content is delivered via the Internet, intranet/extranet, audio or video tape, satellite TV, and CDROM.

E-learning was first called "Internet-Based training" then "Web-Based Training" Today you will still find these terms being used, along with variations of E-learning. E-Learning is not only about training and instruction but also about learning that is tailored to individual. Different terminologies have been used to define learning that takes place online (Lorrain, 2007; Oye , Salleh, & Iahad, 2011).

E-learning and distance learning are not quite the same thing but are different. The basic thing that distinguishes distance education is the physical separation of the students from the teacher/instructor and the class room. E-learning, nonetheless, is considered to be a part of the classroom environment from the beginning. The early use of computers and ICT were geared to support the classroom instructional methods. Gradually, as more and more personal computers became available, the thought of online classes was investigated and explored by

some pioneering Colleges and Universities. The early endeavors at distance education were hampered by resistance from traditionalist within the education field (Heeger, 2007).

2.1.3 E-Learning Trends

1. **Blended learning:** Blended learning is a combination of offline (face-to-face, traditional learning) and online mathematics learning in a way that the one compliments the other. It provides individuals with the opportunity to enjoy the best of both worlds. For example, a student might attend mathematics classes in a real-world classroom setting, and then supplement the lesson plan by completing online multimedia coursework. Blended learning is often also referred to as "hybrid" learning, and can take on a variety of forms in online education environments. While some organizations may only use blended learning techniques on rare occasions, others might utilize it as a primary teaching method within their curriculum. There are two key principles commonly associated with blended learning mathematics students who can share information and work with other students directly in a collaborative setting have a more enriched mathematics learning experience, and collaboration between students can be improved upon if group activities rely on information gathered from mathematics online resources or lessons. It's also been suggested that students who complete online coursework followed by interactive, face-to-face class activities have richer educational experiences.
2. **Micro-learning:** Micro-learning involves mathematics learning in smaller steps, and goes hand-in-hand with traditional e-learning. Activities that are micro-learning based usually feature short term lessons, projects, or coursework that is designed to provide the student with 'bits' of mathematics information. For example, rather than trying to teach a student about a mathematics subject all at once, aspects of the topic will be broken down into smaller lesson plans or projects.

3. **Video Learning:** Video brings a whole new dimension to mathematics teaching methods. If our mathematics course content involves a level of practical skill, this can be demonstrated. Whether it's building a PC or conducting a chemistry experiment, these aspects of the course will most definitely benefit from being seen rather than simply explained in text and static images.
4. **Rapid e-learning:** Students can greatly benefit from rapid e-learning, given that their learning is broken down into smaller units. This can enable them to absorb information quickly and while they are on-the-go or even at work, so that they can still get the data that they need to solve a problem or further their education.

2.1.4 Mathematics E-Learning Resources

Khan Academy: Khan Academy offers practice exercises, instructional videos, and a personalized learning dashboard that empower learners to study at their own pace in and outside of the classroom. This is tackle math, science, computer programming, history, art history, economics, and more. Our math missions guide learners from kindergarten to calculus using state-of-the-art, adaptive technology that identifies strengths and learning gaps. It’s also partnered with institutions like NASA, The Museum of Modern Art, The California Academy of Sciences, and MIT to offer specialized content.

1. **The Math Forum:** The math forum is a leading center for mathematics and mathematics education on the Internet. Our online community includes teachers, students, researchers, parents, educators, and citizens at all levels who have an interest in math and mathematics education. It is work together toward this end in the following ways: Encouraging communication throughout the mathematical community, offering model interactive projects, making mathematics related web resources more accessible, and providing high-quality math and mathematics education content. Aplusmath: Interactive mathematics

resources for teachers, parents, and students featuring free math worksheets, math games, math flashcards, and more.

2. **MathBasis:** Students need help with mathematics like subtraction, multiplication, division, fractions, decimals, and percents? With an emphasis on images and interactives, our mathematics tutorials make learning math easier. The tutorials are designed to be like a math workbook, so we can practice what we learn directly within the lessons and learn at our own pace. By delivering more than 2,000 lessons to millions of people all over the world absolutely free. While our educational model may not be a traditional one, its success speaks for itself. If we are an educator or service provider and are interested in our approach to mathematics curriculum design, here are the central beliefs of our philosophy.
3. **AbsurdMath:** Absurd Math is an interactive mathematical problem solving game series. The player proceeds on missions in a strange world where the ultimate power consists of mathematical skill and knowledge. Many of the pages have hidden clues and areas. Anytime a player needs help, they may email our staff for assistance. We try to respond within two days. Teachers and parents, email us for answer keys.
4. **Desmos:** Desmos wants to help every student learn mathematics and love learning math. But “every student” is a lot of students so we create digital math tools and let the Internet take them to anyone who wants them. It is built the best-in-class HTML5 Desmos graphing calculator, which millions of students around the world use for free. That calculator catches stellar reviews in app stores and from happy users on Twitter. It is also create activities on top of that calculator, helping students use a powerful tool to experience all the curiosity, beauty, and sense that math has to offer. Those activities were used so often by so many teachers around the world that we decided to create an Activity Builder, helping every teacher create digital mathematics activities that equal and exceed the activities create ourselves.

5. **MathPickle:** MathPickle.com is a free online resource of original mathematical puzzles, games and unsolved problems for K-12 teachers. It is supported by the American Institute of Mathematics. It is a practical resource for teachers. Its visually compelling puzzles and games engage students in tough problem solving. Its puzzles are organized by grade and subject – each designed for a 45-60 minute period. All have low-floor, high-ceiling. They engage struggling students in curricular skill acquisition, and deflect top students into tenacity-building challenges. MathPickle gives every student – especially the top students – a regular experience of failure – starting in Kindergarten. This removes the stigma of failure from the classroom. MathPickle also gives every student a regular experience of success. This requires that fast students are adroitly managed so as not to impinge on the full-hearted success of the methodical, slow problem solvers.

2.1 5 E-learning and Pedagogy

E-learning can be viewed as an alternative to the face-to-face teaching method or as a complement to it. E-learning usually allows the student a greater choice as well as responsibility for their own learning (Collis, 2008; Oye et al., 2010). E-learning can change the methods of learning and has the capability to overcome the barriers of time, distance, and economics (Vrasidas & McIsaac, 2000). E-learning can be viewed as "disruptive technology" and as a new paradigm for learning (Christensen, Anakwe, & Kessler, 2001). Disruptive technologies look at problems in completely new and creative ways. E-learning challenges the traditional ways of teaching and learning, enables new alliances between various educational and commercial entities, and presents new ways of solving old problems. For example, the role of teachers is likely to change from importers of knowledge to facilitators of knowledge gaining process.

Synchronous interaction, such as chat and conferencing requires the "physical" or "virtual" presence of participants at the same time. This has the benefit that collaboration is done in real time and delays of communication are avoided.

Asynchronous, such as email, blogs, and threaded discussions have the advantage of allowing the students to access the learning resources any time. Asynchronous mode of communication is useful when parties have to communicate and share information (i.e. intermediate software progress modules) between the interaction sessions, it is important to reflect and discover.

Asynchronous interaction is also beneficial when students are geographically dispersed and it is difficult to assemble them at the same time. Reflection can reinforce and enhance learning. Reflection is a form of mental processing – a form of thinking – which we use to fulfill a purpose or to achieve some anticipated outcome. It is applied to relatively complicated or unstructured ideas for which there is no obvious solution; the equivocality resulting from no "single" obvious solution to a software design project requires additional processing of knowledge and understanding and possibly display of emotions (Moon, 1999). Group reflection is an extremely important part of helping students retain what they learn, provide feedback on their performance, and guide them on how to improve their performance on the next group situation (Educators, 2006).

Pedagogy is an encompassing term concerned with what a teacher does to influence learning. As the importance of high quality education and care services for students has become more clearly understood, so has the teacher/educator's role in the provision of these services. Pedagogy is about learning, teaching and development influenced by the cultural, social and political values teacher have for students (Education Scotland, 2005). Pedagogical practice promotes the wellbeing of students, teachers and the school community - it improves students'

and teachers' confidence and contributes to their sense of purpose for being at school; it builds community confidence in the quality of learning and teaching in the school.

E-learning should ensure effective pedagogy and curriculum implementation in the computer age. According to Offorma (2002), curriculum implementation is the planning and execution of the contents of curriculum in order to bring about certain changes in the behavior of the learners and the assessment of the extent to which the changes take place. The primary purpose of implementation is to achieve the objectives of instruction, and achieve retention and transfer of knowledge. E-learning is an instructional medium that permits alternative approaches to curriculum implementation in an ICT age.

The call for application of e-learning in secondary education is to infuse and inject efficiency and effectiveness in curriculum implementation. However, in developing countries like Nigeria, e-learning is challenged with the problem of material devices such as computer, computer laboratories, internet and e-mail facilities, videophone systems and teleconferencing devices, fax and wireless applications, digital library, digital classrooms, multimedia systems and the problem of multimedia courseware development among others (Global Information Technology Report, 2005). Other studies indicated that there is dearth of trained teachers for e-learning, lack of facilities, infrastructures and equipment (Ikemenjima, 2005; and Jegede & Owolabi, 2008).

2.1.6 Impact of E-learning on Students performance

The introduction of e-learning into the school system is one of the innovations and changes in the national policy on education. The world has become a global village and Nigerians have top be trained in the devices and technologies to be able to follow the terms. Peggy and billis (2001) stated that e-learning when used in the teaching of economy enhances students ability to construct knowledge, assume responsibility for their own learning and to realize that

learning is a personal experience that requires active and dedicated participation they concluded that learning should now be thought how to learn , how to search for appropriate information, soot it according to their needs, create knowledge from it, and then report it in a way that has individual and collective learning.

Wiggiins and Ruthmanm (2002) maintained that the introduction of e-learning in the teaching and learning of economics in secondary schools, would enable student to work with real data and access information at a time and place of their choice , and as well as enable them participate in a live online lesson were all participant are able to see and speak to one another while remaining in their locations.

2.1.7 Concept of Academic Achievement or performance

According to Wikipedia (2019), academic achievement is the extent to which a student, teacher or institution has achieved their short or long term educational goals. It is the state in which students accomplish their task and studies. Okpapi (2018) sees academic achievement as a successful accomplishment or performance in particular subject area. It is indicated by grades, marks and scores of descriptive commentries. Academic performance also means how students deal with their studies and how they cope with or accomplish different tasks given to them by their teachers in a fixed time or academic year (Rothestein, 2000).

Fati (2016) expressed that Academic performance is the outcome of education, the extent to which a student, teacher or institution has achieved their educational goals which is usually measured by examinations, tests or continuous assessments. Similary, sani (2018) defines academic achievement as the cognitive achievement of students that can be measured in terms of passes in test or examinations that would be administered by the teachers or examination bodies.

However, acadmic performance of students have been given considerable attention on previous researches, it is a challenging aspect of academic literature and the performance of science students are being affected due to economic environmental, psychological and personal factors (Dubagari, 2018). These factors has strongly influence the performance of students. Poor academic performance.

According Aremu (2000) is a performance that the examiner determines and confirms that the examinee or testee has fallen below the expected standard. Joseph (2018). Expressed that a criteria of excellence can be from 40% to 100% depending on the subjective yardstick of the evaluator or assessor. For example, a 70% score performance can be judged excellent while a 37% score which is below 40% can be judged poor performance. Poor academic achievement on students has been a great challenge in Nigeria as a while, parents and the government putting their resources or investment in the educational system believes that resources or investment in the educational system believes that it is not yielding positive results, teachers on the other end complains about the student's low performance both in the internal and external examinations (Omogbehin, 2017).

A number of studies have been conducted to identify and analyse the numerous factors that influenced academic performance in various centers of learning Joseph (2018). Expressed that results identified shows that student's efforts, previous schooling, parents education, family income, sel of motivation, students age, learning preferences, class attendance, entry qualifications among others are factors that have a significant effect on the students' academic performance in various settings. Also Dubagari (2018) opined that student's performance is greatly influenced by teacher's attitudes. In view of this, the researcher feels that using indigenous languages (such as Hausa language) as medium of instruction in teaching and learning, could be of great help to these menaces.

2.1.8 The Role of Prior Computer Skills on Performance in E-Learning Setup

Some learners are better prepared than others to use e-learning technologies to facilitate their educational progress; individual "readiness" seems to be a crucial factor in accounting for the success of e-learning applications in education. Looker and Thiessen (2002), in their paper noted that digital divide for Canadian youth, remarked that access to, and experience with, computer technology determines "computer competency", and that this competency is generally associated with urban residents of higher economic status.

Levin and Arafeh (2002) remarked on the differences between students who are highly gifted in the internet usage and those who have had little opportunity to develop their experience with networking tools. Dewar and Whittington (2000) concluded that adult learners' learning styles (as indicated by Myers-Briggs personality types) can predict the pattern of their participation in online courses. It is interesting to note however, that a key learning-style related factor may in fact be the student's familiarity with the technology. A number of studies have shown that computing experience is a strong predictor of attitudes towards, and also use of, computers and the internet (Atkinson & Kydd, 1997). In effect, the student's learning style may adapt and improve as familiarity with the e-learning medium increases.

2.1.9 The Role of Socio-Demographic Characteristics on Academic Achievement

There have been numerous studies on the relationship between socio-demographic characteristics and academic performance. Some studies focused on specific socio-demographic Variables and e-learners' academic performance, characteristics or areas such as gender and learning styles (Blum, 1999; Shaw & Marlow, 1999; McLean & Morrison, 2000), ethnicity and learning styles (Jaju, Kwak&Zinkham, 2002), academic performance and learning styles in both Information Technology (IT) and non- Information Technology (non-IT) subject areas and in distance and contact courses (Aragon, Fowler, Allen, Armarego& Mackenzie, 2000; Papp, 2001; Johnson &Shaik, 2002; Neuhauser, 2002; Zywno&Waalen,

2002), level of educational attainment, number of children in the family, full-time work experience, family income level (Abdul-Rahaman, 1994; Parker, 1994; Whittigton, 1997), age, marital status, employment status (Woodley & Parlett, 1983; Chacon-Duque,1985; Powell, Conway & Ross, 1990), number of hour employed per week, distance traveled to study centre, learners' previous educational level (Wang & Newlin, 2002).

Studies above established divergent findings. For example, for first year programming courses, Thomas, Ratcliffe, Woodbury and Jarman (2002) reported that there was a relationship between student learning style and academic performance, while Byrne and Lyons (2001) established that no such relationship exists. Also, Woodley and Parlett (1983) found that previous educational level, gender, age and occupation were associated with persistence and academic performance. Similarly, Powell et al. (1990) established that marital status, gender and financial stability contributed significantly to distance learners' academic performance. Conversely, Chacon-Duque (1985), Wang and Newlin (2002) and Ergul (2004) found that educational level, age, gender, employment status and number of children in the family were not significant predictors of distance learners' academic performance. Based on the findings from above studies on the relationship between socio-demographic characteristics and academic performance, it appears the issue remains inconclusive. Cuneo, Campbell & Harnish (2002) list several individual characteristics that may determine the outcomes of technological interventions: motivation, computer skills, literacy skills, communication skills, and learning styles. Cuneo and Harnish (2002) point out that "quasi-open computer-mediated environments are not safe places for students unsure of their writing skills and knowledge, online learning might not be appropriate for all students". Looker and Thiessen (2002) in their survey of Canadian high school students indicated that females demonstrated less interest (and less confidence) in achieving computer competency. Bryson, Petrina and Braundy (2003) studied "gender-differentiated participation" in British Columbia schools; they noted that the

percentage of girls enrolled in technology-intensive courses remains extremely low, while performance data indicate that those female students who participate in these courses do better, on average, than male students in these courses.

Li (2002) observed that, female students tend to initiate conversations, while male students are more likely to enter the dialogue at later stages and respond to previous discussions. Individual metacognitive factors are also implicated in student success as Karsenti (2001) points to the relevance of self-direction and self-regulation in university students, concluding, "The main difficulty encountered by students seemed to be their lack of autonomy or the trouble they had in learning by themselves, in managing their own learning".

2.1.10 Student Engagement (Hours Spent Online/Offline)

Research suggests that student academic performance may be affected by both engagement effects and learning-style effects. Carini et al (2006) found that, although in general, the relationship between engagement and performance is complex, engagement is positively correlated with student performance. Their conclusion is supported by a number of empirical studies: Rodgers and Ghosh (2001) identified that 'effort' (or engagement) levels were highly significant in determining student examination performance. Although, another study made in an e-learning context (Davies and Graff, 2005) found that online engagement had no statistically-significant impact on examination performance. Additional studies in this area have examined the issue of what determines the amount of time that a student spends on e-learning. Arbaugh (2000) argues that this will depend on the student's attitude to the perceived usefulness, and also the ease of use, of this delivery medium. It is suggested that students who spend more time on internet-based courses tend to be the ones who take more ownership of the learning process, and as a consequence receive the greatest learning benefit (good performance as measured by grades). From this it can be inferred that we might expect to find a significant, and positive, relationship between the level of e-learning engagement and academic

performance. The ability to effectively manage learning time is an important element in of electronic learner success (Kearsley, 2000). Palloff and Pratt (1999) hinted that interacting in a Web-based course can require two to three times the amount of time investment than in a face-to-face course. Roblyer (1999) pointed that students who have difficulty managing time are more likely to achieve less in a distance course or drop out altogether. Gibson (1998) pointed out that a key construct relating to distance learners' persistence is their self-efficacy for learning at a distance and that personal perceptions of competence (self-efficacy) are related to learners' perceptions of their ability to manage time effectively.

Students who use their time efficiently are more likely to learn and/or perform better than students who do not have good time management skills. Zimmerman and Risemberg, (1997) opine that self-regulated learners know how to manage their time because they are aware of deadlines and how long it will take to complete each assignment. They prioritize learning tasks, evaluating more difficult from easier tasks in terms of the time required to complete them. They are aware of the need to evaluate how their study time is spent and to reprioritize as necessary. The other key performance-influencing issue relates to differences in student learning styles. These may result in differences in the effectiveness of e-learning delivery methods for individual sub-groups within the student body. Within the learning-styles literature the notion that different learners have different cognitive styles has been widely examined (Klob, 2000). In addition to be general indication, there is a considerable support in the literatures for the suggestion that there are identifiable variations in the learning styles of sub-groups within the student population.

2.1.11 Use of E-Learning in the Teaching and Learning of Sciences and Mathematics

The use of e-learning in science and mathematics classes very essential. It will not only help to make the teaching and learning of science and mathematics to share in educational revolution (Liverpool, Ndam and Oti, 2010) which e-learning brings into educational system but also to

tap the benefits of a more effective method of teaching and learning offers (Yaakub & Finch,2010). The efficacy of e-learning in science and mathematics education was questioned by Borba and Bartolini(2010) and replied stating that e-learning may not be different from other technological innovative strides that have been present in science and mathematics education for long but failed to produce significant impact in the teaching and learning of the subjects. If close scrutiny is carried out (Kidwell, Ackerberg & Robert, 2008) it would be discovered that much is still needed to be done to ensure that advantage of e-learning technology is optimally exploited.There is also the question of how effective e-learning has solve the problem learning mathematics. Dhariwal(2010)comparatively x-ray the traditional method and e-learning approach to teaching mathematics and science subjects and averred that e-learning make room for individualized learning whereby learners progress at their own pace which is absent in traditional method of instruction. The e-learning method obviously personalize the instruction, avail the gist and gem of various learning styles of each learner, boost the confident level of learners, brings about constructive modification in the roles of teachers and learners as wells fosters desirable student teacher relationship(Dhariwal, 2010).

Kajetanowtcz & Wierzejewski (2010) pinpointed that e-learning has no rival when it comes to generation of intrinsic motivation and initiation of organized active learning in mathematics and science education. They equally see e-learning as an efficient means of promoting self-study cum frequent testing in the form of formative evaluation which engender proper monitoring of educational progress and periodical achievement. Overall research report shows that e-learning provide positive effect on learners achievement in mathematics.

2.2 Theoretical Framework

The focus of this study is built upon the various learning styles theories of E-learning, and how learners gain knowledge differently. Facilitation theory and constructivist theory are two

popular learning theory concepts which are used as a representation as a taxonomy for learning (Etmer & Newby, 1993). According Eccles (1999) developing a system of best practices built around these learning theories can assist teachers in encouraging improved student preparedness and instruction presented within an E-learning environment of higher education.

2.2.1 Constructivism Theory

Constructivism is the theory that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. When learners encounter something new, they reconcile it with previous knowledge and experience. They may change what they believe, or they may discard the new information as irrelevant. To be active creators of their knowledge however, they must be able to ask questions, explore and assess what they know. In the classroom, the constructivist view of learning means encouraging students to use active techniques such as experiments and real-world problem solving using authentic data if possible, and to create knowledge and reflect on their understanding.

Constructivism modifies the role of the teacher so that teachers help students to construct knowledge rather than reproduce a series of facts. The constructivist teacher provides tools such as problem-solving and inquiry-based learning activities like in e-learning setup so that students can formulate and test their ideas, draw conclusions and inferences, and convey their knowledge in a collaborative learning environment. The teacher must understand the students' preexisting conceptions and guide the activities to address this knowledge and then build on it. Constructivist teachers encourage students to assess how the activity is helping them gain understanding. By questioning themselves and their strategies, students become expert learners as they learn how to learn, with the use of computers online and/or offline. The students then have the tools necessary to become life-long learners.

The teaching-learning method in e-learning is assumed to be self-directed learning (SDL), which is supported by the educational philosophy of constructivism. According to constructivism theory, e-learning is an active information process because knowledge generation is accomplished through individual experience, maturity and interaction with one's environment. Due to this point of view, the educational philosophy of constructivism is distinguished from objectivism in that the learner is regarded as a passive recipient of information (Rovai, 2004).

Learning performance in regards to e-learning is possibly lower than a crammed educational style based on objectivist educational philosophy, with the exception of a strategic approach relating to the efforts and studies for the pleasure of the self-learner. Lee et al., (2007) point that the SDL teacher is available as an assistant and guide for learning, not as a unilateral knowledge source and messenger.

Learners take the lead in self-regulated learning for the development of a total learning process that involves problem perception, adoption, and assessment of alternatives (Lee, 2004). Learners play the same roles that the producers do by organizing or re-organizing knowledge like a consumer, by selecting knowledge and using it practically (Thatcher& Pamela, 2000).

E-learning must be considered as one of many SDL strategies. The reason is that an e-learner attends a lecture only to register the time, place, subject, and to alter the order of attending lectures. Proper monitoring of the learner is difficult in comparison with the off-line education already being used, not only because the learning progress method of evaluation is being altered, but because personal meetings with the teacher are also no longer part of the process. Therefore, it is important to manage one's ability to organize self-learning time, process information, plan data, and control data.

2.2.2 Facilitation Theory (The Humanist Approach)

Learning theory developed by Carl Rogers. One of the basic premises of this theory is that learning is possible because human beings have a "natural eagerness to learn" and they are responsible for and at the center of the learning process (person-centered learning). E-learning is possible only because individuals signed up in it are self-driven and eager to learn despite their location in relation to learning institutions. The role of the teacher is to act as a facilitator- no amount of effort on the part of the teacher can guarantee success, unless the learner has a desire and predisposition to learn.

An interesting contribution of Rogers's Facilitation Theory is the notion that learning involves changing one's self-concept. Such changes may involve discovering one's strengths or weaknesses. Learners in the e-learning setup have to perceive the possibility that there is in the e-learning system for knowledge acquisition. A freshly perceived self-concept has a consolidating impact on learning in that it allows the learner to attack a target skill with confidence or with an adjusted 'updated' approach.

Implicit in the non-direct facilitative approach is the assumption that learners can find the information by themselves (teachers merely facilitate that process), an assumption which downplays the role of information transmission and underestimates the contribution of teaching. Such a teaching model is obviously an idealization which is rarely found in its pure form in practice.

2.3 Empirical Study

Studies show that accessibility to e-learning facilities form the bases of success of university programmes. In Jamia Millia Isilomia Central University, (Naqvi 2007) found that access to e-learning facilities motivates students to search for information for research proposes and for

effective learning. It was also found that the provision of many computer terminals enhance access to e-learning at Guru Wanak Development University.

(Kaur, 2006). However, Chetan's (2009) study revealed that 80% of teachers and 86.67% of researchers have access to e-learning opportunities in Guru Gbina Slugh, Indraprastha University, India. This made their research works faster, easier and better. Also, Lazenger, Barilan, Peritz (1997) study indicated that only a very poor percentage (12.5 %,) of the university students have access to internet facility with 83% relying on their personal laptops while 91.7% relied on cyber cafés. They also found that only 4.1% have access to e-learning through university internet connectivity. Similarly, Eze (2012) observed that teachers have poor access to e-learning facilities in Enugu state, Nigeria. Eze's study revealed that only 14.5% of secondary school teachers in Enugu State, Nigeria, had personal computers (PC) or laptops while only 21.2% of them have e-mail accounts.

Sharma (2003) notes that the use of ICT improves the quality of education by facilitating learning by doing, real time conversation, delayed time conversation, directed instruction, self-learning, problem solving, information seeking and analysis, and critical thinking, as well as the ability to communicate, collaborate and learn (Yuen et al, 2003). Casal (2007) mentions that ICTs also provide a platform for sharing information and knowledge and this can be used for the betterment of program delivery in terms of replication of best practices (Mason, 2000). It allows mass customization in terms of content and exams and reduces costs per student making education more affordable and accessible, increasing enrollments, improving course quality (Ozdemir and Abrevaya, 2007).

Evarest and Laura (2011), in their study on learning electronically in Nigerian universities, revealed that the e-learning facilities were inadequate and students' access to these facilities is very negligible. They also revealed some inhibitors to the use of e-learning facilities which

include power outages, obsolete e-learning facilities, lack of skilled manpower and poor infrastructure and recommended that government should show more political-will by increasing the financial resources available to the universities especially in the area of e-learning facilities which is capital intensive, among others.

Sam (2011), argued that e-learning is a logical and strategic approach to achieve the technological transformation of Nigeria, adding that the deployment of ICT is critical in the implementation of education road map, which is designed to revamp the education sector. According to Sam (2011), e-learning is expected to redefine education, for example, the classroom will no longer be demarcated by brick walls rather "students can communicate with their teachers from their bedroom or wherever they are, especially during strikes, while housewives can receive lecturers from their kitchen without having face-to-face interaction with their teachers. He also identified infrastructural unavailability as the bane of e-learning in Nigeria especially with the erratic power supply situation compounded by lack of access to technology.

Nwaosa, Ikechukwu and Okolocha (2014) carried out a study to determine the extent of utilization of e-Learning technologies by business educators in tertiary institutions in Edo and Delta states of Nigeria. Five research questions were raised to guide the study, while three hypotheses were formulated and tested at 0.05 level of significance. Descriptive survey research design was employed for the study. A total of 173 practicing business educators selected from universities, polytechnics and colleges of education in Edo and Delta states made up the population. The data collection instrument was a 56-item questionnaire that was structured on a five point Likert type rating scale. The data collected for the study were analyzed using mean and standard deviation for the five research questions, while the t-test and One-way Analysis of Variance (ANOVA) were also used for testing the null hypothesis. The findings revealed that business educators rarely utilized e-Learning technologies such as: hard

ware. It also showed that gender has no effect on the extent at which business educators in tertiary institutions utilize internet facilities in teaching business education courses in their various institutions.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter describes the design of the study, area of the study, population, sample and sampling technique, research instrument, validity of the instruments, reliability of the instruments, method of data collection and method of data analysis.

3.1 Research Design

This study employed a quasi-experimental design using pre-test and post-test non-randomized control group design. According to Ofaha (2013), quasi – experimental design is a design whereby randomization of subjects to the experimental and control groups is not possible. This is why is called non – randomized design. This design was adopted in order not to disrupt the normal classes of the students and the schools selected for the study. The study was carried out in Niger-state in Nigeria. Two secondary schools were purposively sampled because school type is a factor in this study. one intact classes were selected from each school using simple random sampling technique. One class was assigned to experimental group while the other was assigned to control group. The sample comprised of 203 SSII students in the study area while the target population consisted of 13, 420 SSI students in the education zone. The experimental groups were taught with computer Assisted Instruction (CAI) while the control groups were taught in a conventional manner without CAI (Elearning).

3.2 Area of The Study

The area of the study covers some selected senior secondary schools in Minna Metropolis, Niger State. Minna Metropolis is made up of two local government namely Chanchaga and Bosso local government

3.3 Population of the Study

The population for this study consist all the public senior secondary schools in minna metropolis, the total number of the public senior secondary schools in minna metropolis are twenty three (23), spread across the two local government areas in the metropolis. The population of the senior secondary schools student in the twenty three (23) schools were twenty six thousand nine hundred and seventy five (26,975). See appendix A,. The target population for this study comprised twenty – one thousand seven hundred and nine - two (21,792) SSII Mathematics students which include 7193 male and 14599 female. (PRS department, Niger State Ministry of Education, 2019). See Appendix B.

3.4 Sample and Sampling Technique

The sample and sampling techniques used for this study is random sampling techniques was used in selecting two (2) schools from the two local governments in minna metropolis. Simple random sampling with replacement was adopted in selecting one schools from each local government. From the sampled schools, one schools were further assigned randomly into the experimental groups and the other one as control groups.

The sample size of the study was two hundred and 202 students drawn from the two schools in the clustered sample. See Appendix C. The figure (393) was statistically determined by using the "Yaro Yamane formular" i.e n = $\frac{N}{1+N(e)^2}$

Where:

N = the targent population

n = sample size

e = level of significance or limit of tolerable error. And 1 = unity contstant (Gambari, 2019)

Thus:

$$n = \frac{21,792}{1+21,792(0.05)^2} = 393$$

3.5 Research Instrument

A mathematics achievement test (MAT) which contains 20 multiple choice questions was developed by the researcher in accordance with SSII mathematics curriculum. Each item of the research instrument is a multiple choice objectives question with four (4) different option (A – D) for the student to choose from within the period of forty (40) minutes, this for the sole purpose of testing the students understanding on the concept taught. This will be marked and scored in percentages.

3.6 Validation of the Research Instrument

The instrument was validated by two experts. One whom is doctorate degree holder from department of science education, federal university of technology minna and other whom is master degree from department of computer science, college of education minna.

3.7 Reliability of the Instrument

The two instruments; E-MAT were pilot – tested using sample of the same characteristics outside the sampled schools. Test and re – test method with one week interval of time was used to determine the reliability coefficient of E-MAT using Pearson Product Moment Correlation Formular (PPMC), while split – half method using spearman rank order correlation coefficient (Brown formular) was applied to determine the reliability coefficient of MAT. The reliability coefficient was calculated to be r=0.75 for E - MAT. The results seen to be appropriate for the research work.

3.8 Method of Data Collection

The researcher come to the two (2) schools and sought the permission of the principals and the full assistance of the mathematics teacher in the schools. A total of two hundred (200) SS2 students consisting of 196 boys and 197 girls were selected randomly for the study from the two schools. After teaching in each of these schools for two weeks, each lesson lasted for the period of forty (40) minutes based on senior secondary school time table for teaching mathematics in Niger State, then the instruments were administered to both the experimental and the control groups, the scores were collected, recorded and subjected to data analysis

3.9 Method of Data Analysis

Mean, Standard deviation and t – test were used to test the hypothesis indicated in chapter one and statistical package for social science (SPSS) was used to carry out the analysis.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0 Introduction

The reason behind this study was to determine the Effect of e-learning on students' academic achievement in Mathematics in senior secondary school in some selected secondary school in Metropolis. This chapter contains the presentation of the results, data analysis and the discussion of the results.

4.1 Presentation of Results

The data gather through the administration of the achievement test on the mathematics topic taught were analyzed. Two research questions were raised and respective null hypotheses formulated were tested. A 0.05 level of significant were adopted for the analysis which formed the basis for accepting or rejecting the Null hypothesis indicated. The result of the analysis are presented below.

Research Question One: What is the difference in the mathematics achievement of the experimental group (student taught with e-learning package) and the control group

Table 4.2: Mean and Standard Deviation of Pretest and Posttest Scores of Experimental and Control Group

GROUP	N	Pretest		Posttest		Mean Gain
		X	SD	X	SD	
Experimental	197	22.14	5.92	45.43	9.74	23.09
Control	196	21.67	8.37	43.12	11.40	21.45

Table 4.2 shows the mean and standard deviation of the mean achievement scores of experimental group and control group in pretest and posttest. The result revealed that mean and standard deviation scores of the pretest and posttest experimental group are $\bar{X}$ =22.14, SD = 5.92 and $\bar{X}$ = 45.43, SD = 9.74 respectively. This gives a mean gain of 23.09 in favour of the posttest. On the other hand, the mean and standard deviation of the pretest and posttest of the control group are $\bar{X}$ = 21.67, SD = 8.37 and $\bar{X}$ =43.12, SD = 11.40 respectively and gives a mean score of 21.45 in favour of the posttest. The result also revealed that experimental group and control group had mean gain of 23.09 and 21.45 respectively, and with the experimental group having the highest mean gain of 23.09.

Research Question Two: Is there any difference between the post-test academic achievement of male and female students in the experimental group?

Table 4.3: Mean and Standard Deviation of male and female Scores of Experimental

GROUP	N	Pretest		Posttest		Mean Gain
		X	SD	X	SD	
Male	98	21.88	6.27	43.67	9.06	21.79
Female	99	22.46	5.56	47.27	10.12	24.81

Table 4.3 shows the mean and standard deviation of the mean achievement scores of experimental group and control group in pretest and posttest. The result revealed that mean and standard deviation scores of the pretest and posttest for male in the experimental group are $\bar{X}$ =21.88, SD = 6.27 and $\bar{X}$ = 43.67, SD = 9.06 respectively. This gives a mean gain of 21.79 in favour of the posttest. On the other hand, the mean and standard deviation of the pretest and posttest of the female in experimental group are $\bar{X}$ = 22.46, SD = 5.56 and $\bar{X}$ =47.27, SD = 10.12 respectively and gives a mean score of 24.81 in favour of the posttest. The result also

revealed that male and female had mean gain of 21.79 and 24.81 respectively, and with the female having the highest mean gain of 24.81.

Hypothesis One: There is no significant difference between mean achievement scores of student in the experimental and those in the control.

Table 4.4: t-test Analysis of Achievement of control and experimental

Variation	*N*	*mean*	*SD*	*Df*	*T – cal*	*P – value*
Control	196	43.42	513.9594	196	1.97	0.05
Experimental	197	45.48	116.9502			

Table 4.4 shows the results of the analysis of variance on achievement of students taught with e-learning and those taught in conventional method as a medium of instruction. As shown in (Table 4.4) revealed degree of freedom (d.f) = 196 and t – cal = 1.97 at p = 0.05. since p = 0.05 which is greater than 0.05. the null hypothesis was accepted. This implies that there is no significant difference between the control and experimental group.

Hypothesis Two: There is no significant difference between the post-test academic achievement of male and female students taught with e-learning.

Table 4.5: t – test Analysis of Achievement of Male and Female Students Taught Mathematics Using E-learning

Variation	*N*	*Mean*	*Df*	*t-cal*	*P-value*
Male	97	43.71	190	1.97	0.06
Female	98	46.37			

Table 4.5 shows the results of the analysis of variance on achievement of Male and Female Students Taught Mathematics Using e-learning as instrument shown in (Table 4.5) revealed degree of freedom (d.f) = 190 and t – cal = 1.97 at p = 0.06. since p = 0.06 which is greater than 0.05, the null hypothesis was accepted. Therefore, there was no significant difference between the post-test academic achievement of male and female students taught e-eLearning.

4. 6 Discussion of the Result

The results presented in the tables showed that there is significant difference in mean achievement of students taught with E-learning and those taught with conventional method. It implies that the achievement score of students in the experimental groups were improved and more encouraging than those students taught with conventional method. The findings have in turn given support to what was formerly stated that lack of infrastructure and equipment and poor teaching method all contribute to students' lack of interest. It was also discovered that techniques employed in teaching can affect negatively or positively the interest of the learner. The results also indicated that there is no significant difference in the mean achievement scores of male and female in the experimental.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMAND

5.0 Introduction

This chapter presents the summary of the research, conclusion and recommendation for the study.

5.1 Summary of the study

This study was undertaken to determine the Effect of e-learning on students' academic achievement in Mathematics in senior secondary school in some selected secondary school in Metropolis of Niger State.

Simple Experimental research design was adopted in carrying out this research which was meant to find out students achievement between the experimental and control compare the effectiveness of teaching in the experimental and the control group and finally compare the achievement of male and female student in the experimental. Data are collected analyzed and decision were made based on the analysis. Finding from this work reveal that using of elearning have positive influence on the teaching and learning of mathematics, significant difference did not exist in the performance of the students in the experimental and the control group and there was not significant difference between mean achievement scores of male and female student in the result.

5.2 Conclusion

The findings of the study have shown that the students in the experimental groups have mean higher than that of the control groups. This means that E-Learning as equipment or instructional instrument used for the study has positive effect on interest of the student. Based on this, the use of ELearning should be encouraged and recommended for teachers in teaching and learning

so that our students can compete with their mates elsewhere and also face the challenges of this present era which is technology era.

5.3 Recommendation

Based on this finding, the study recommended that

1. Teachers should be exposed to the use of E-Learning in teaching and learning by training and retraining so as to keep them abreast of the innovation in teaching.
2. Government should establish ICT Orientation and training for the teachers in order to use it for teaching.
3. Student should be encourage and train in the use of computer for test and examine

REFERECES

Abdul-Rahman, Z. (1994). Factors related to completion of distance education courses in the off-campus degree programme at the university saints of Malaysia. UMI (UMI No. 9425449).

Al-Ammari, j. And Hamad, S. (2009), *"Factors Influencing The Adoption Of E-Learning At UOB",* University Of Bahrain.

Ani, Okon E. and Ahiauzu, B. (2008). Towards effective development of electronic information resources in Nigerian University Libraries. *Library Management* 29(6/7): 504 – 514.

Aragon, S. R., Johnson, S. D., & Shaik, N. (2002). The influence of learning style preferences on student success in online versus face-to-face environments. *The American Journal of Distance Education, 16*(4), 227-244.

Arbaugh, J. B. (2000). How Classroom Environment and Student Engagement Affect Learning in Internet-based MBA Courses. *Business Communication Quarterly*, 63(4), 9-26.

Atkinson, M. &Kydd, C. (1997). Individual characteristics associated with World Wide Web use: An empirical study of playfulness and motivation. *The Data Base for Advances in Information Systems, 28*(2), 53-62.

Barker, K., &Wendel, T. (2001). E-Learning: Studying Canada's Virtual Secondary Schools. Kelowna, BC: Society for the Advancement of Excellence in Education. Online athttp://www.excellenceineducation.ca/pdfs/006.pdf.

Blum, K. D. (1999). Gender differences in asynchronous learning in higher education: Learning styles, participation barriers and communication patterns. *Journal of Asynchronous Learning Networks, 3*(1).

Bond, A. (2002). Learning Music Online: An Accessible Program for Isolated Students. Kensington Park, SA: Australian National Training Authority. Online athttp://www.ncver.edu.au/research/proj/nr1013.pdf.

Boyd, D. (2004). The characteristics of successful on-line students. *New Horizons in Adult Education, 18*(2), 31-39.

Breuleux, A., Laferrière, T., &Lamon, M. (2002, May). *Capacity building within and accross countries into the effective uses of ICTs*. Paper presented at the 2002 Pan-Canadian Education Research Agenda Symposium, Montreal, QC. Retrieved from http://www.cesc.ca/pcera2002E.html

Bryson, M., Petrina, S., & Braundy, M. (2003). Conditions for success? Gender in technology-intensive courses in British Columbia secondary schools. *Canadian Journal of Science, Mathematics and Technology Education,3*(2), 185–193.

Calderoni, J. (1998). Telesecundaria: Using TV to Bring Education to Rural Mexico. Education and Technology Technical Notes Series: World Bank Human Development Network. http://wbln0018.worldbank.org/HDNet/HDdocs.nsf/C11FBFF6C1B77F9985256686006DC949/1635F1703FE053B385256754006D8C3F/$FILE/telesecundaria.pdf

Calvert, B. (1986). 'Facilitating transfer of distance courses'. A paper presented at the 8th World Conference of International Council of Distance Education, Melbourne, Australia.

Carini, R.M., Kuh, J.D. & Klein, S.P. (2006). Student Engagement and Student Learning: Testing the Linkages. *Research in Higher Education*, 47, 1-32.

Cavanaugh, C. S. (2001). The effectiveness of interactive distance education technologies in K-12 learning: A meta-analysis. *International Journal of Educational Telecommunications,7*(1), 73–88.

Chacon-Duque, F. J. (1985). Building academic quality in distance higher education. Monograph in higher education evaluation and policy, Pennsylvanian PSU.

Chambers, E. A. (2003). *Efficacy of educational technology in elementary and secondary classrooms: A meta-analysis of the research literature from 1992–2002.* Ph.D. dissertation, Southern Illinois University at Carbondale. Retrieved November 8 2005, from ProQuest Digital Dissertations database. (Publication No. AAT 3065343).

Chimombo, J.P.G. (2005): Issues in basic education in developing countries: an exploration of policy options for improved delivery. CICE Hiroshima University, Journal of International Cooperation in Education, Vol. 8 (1), pp. 129-152.

Christmann, E. P., &Badgett, J. L. (2003). A meta-analitic comparison of the effects of computer-assisted instruction on elementary students' academic achievment. *Information Technology in Childhood Education Annual,15*, 91–104.

Coldeway, D.O. (1982). Learner characteristics. I. Mugridge& D. Kaufman (Eds). Distance education in Canada. Pp. 81 – 93. London: Croom Helm.

Cookson, P. S. (1989). "Research on learners and learning in distance education". A review of American journal of distance education, 3(2), Pp. 22-34.

Cuneo , C. J., &Harnish, D. (2002). *The lost generation in e-learning: Deep and surface approaches to online learning [Report]*. Hamilton, ON: McMaster University. (ERIC Document Reproduction Service No. ED466646).

Cuneo , C. J., Campbell, B., & Harnish, D. (2002, May). *The integration and effectiveness of ICTs in Canadian postsecondary education.* Paper presented at the 2002 Pan-Canadian Education Research Agenda Symposium, Montreal, QC.

Davies, D., & Graff, M. (2005). Performance in e-learning: online participation and student grades. *British Journal of Education Technology,* 36, 657-663.

Dees, S. (1994). An Investigation Of Distance Education Versus Traditional Course Delivery Using Comparisons Of Student Achievement Scores In Advanced Placement Chemistry And Perceptions Of Teachers And Students About Their Delivery System (Satellite Course). Northern Illinois University.

Dewar, T., & Whittington, D. (2000). Online learners and their learning strategies. *Journal of Educational Computing Research, 23*(4), 385–403.

Eccles, J. S. (1999). The development of children ages 6 to 14. *The Future of Children:When School Is Out, (9),* 30-44.

Emerson, T.L.N., & Taylor, B.A. (2004). Comparing Student Achievement across Experimental and Lecture-Orientated Sections of a Principles of Microeconomics Course. *Southern Economics Journal*, 70, 672-693.

Ergul, H. (2004). "Relationship between students characteristics and academic achievement in distance education and application to students of Anadolu University in Turkish Online Journal of Distance Education. 5(2)

Etmer, P., & Newby, T., (1993). Behaviorism, cognitivism, and constructivism: Comparing critical features from an instructional perspective. *Performance Improvement Quarterly*, *6*(4), pp. 50-70. *Evolution,* Information Science Publishing.

Fisher, C. (2007), *Researching and writing a dissertation for business students*. 2nd ed. England: Pearson Education Limited Online Resource.

Fry, K., (2000), *"Forum focus and Overview, The business of E-learning: Bringing your organization in the knowledge Economy",* Telcam Group, University of Technology, Sydney.

Garrison, D.R. (1987). "Researching dropout in distance education". Distance education. 8(1). Pp. 95-101.

Garrison, R., & Anderson, T. (2003). *E-learning in the 21st century: A framework for research and practice.* London: Routledge Falmer.

Gibson, C. C. (1998). The distance learner's academic self-concept. In C. C. Gibson (Ed.) *Distance learners in higher education: institutional responses for quality outcomes* (p. 65-76). Madison, WI.: Atwood Publishing.

Gulatee, Y., and Combes, B. (2007), *"Technological barriers to successful E-learning in computer science",* School of computer and Information Science Edit Cowan University

Hawkins, R.: Ten Lessons for ICT and Education in the Developing World. In: Kirkman, G. et al. (Eds): The Global Information Technology Report 2001-2002: Readiness for the Networked World, Oxford Universitz Press, Oxford 2002, 38-43.

Hodgkinson-Williams, C.; Siebörger, I.; Terzoli, A. (2007): Enabling and constraining ICT practice in secondary schools: case studies in South Africa. International Journal of Knowledge and Learning, Vol.3 (2/3), pp. 171-190.

Jaju, A., Kwak, H., &Zinkham, G. M. (2002). Learning styles of undergraduate business students: A cross-cultural comparison between the US, India and Korea. *Marketing Education Review 12*(3), 49-60.

Johnson, G.M. (2005). Student Alienation, Academic Achievement, and WebCT use. *Educational Technology and Society*, 8, 179-189.

Karsenti, T. (2001). From blackboard to mouse pad: Training teachers for the new millennium. *Education Canada,41*(2), 32–35.

Kazmer, M. M. and Haythornthwaite, C. (2005), *"Multiple perspectives on online learning"*, *ACM Press, 25*(1), pp.7-11.

Kearsley, G. (2000). *Online education: learning and teaching in cyberspace*. Belmont, CA.: Wadsworth.

Keegan, D. (1996). Foundations of Distance Education. London: Routledge.

Khan, B (2005), *Managing E-learning Strategies: Design, Delivery, Implementation and*

Klob, D.A. (2000). *Facilitator's Guide to Learning*. Boston: Hay/McBer Training Resources Group.

Kohn, T.; Maier, R.; Thalmann, S. (2008): Knowledge transfer with e-learning resources to developing countries – barriers and adaptive solutions. In: Breitner, M.H. et al. (eds.): E-Learning. Springer, Heidelberg.

Koohang, A. & Harman, K. (2005). Open source: A metaphor for e-learning. *Informing Science: The International Journal of an Emerging Transdiscipline*, 8, 75-86. Available athttp://inform.nu/Articles/Vol8/v8p075-086Kooh.pdfMacDonald, C. J., Stodel, E., Thompson, T. L., Muirhead

Kumar, A. (2001). An investigation into the India open University distance learners' academic self-concept, study habits and attitude toward distance education: A case study at the IndraGhandi national open University in India. www.col.org/forum.PCFpapers/kumara.pdf.

L. R. Gay, Educational Research: Competencies for Analysis and Application, 3rd ed., (Columbus, Ohio: Merrill Publishing Company, 1987).

Learning Objects, 1, 197-216. Available at http://ijklo.org/Volume1/v1p197-216Recker.pdf

Lee, J. K., 2004. *The effect of e-Learning environmental quality and self-efficacy on effectiveness of an e-Learning*. Business Administration Doctoral Dissertation, Daegu University.

Lee, J. K., and Lee W. K., 2007. The relationship of e-Learner's self-regulatory efficacy and perception of e-Learning environmental quality. *Computers inHuman Behavior*, Available online at www.sciencedirect.com.

Lee, Y- C. (2006), *"An empirical investigation into factors influencing the adoption of an e-learning system"*, Online Information Review, Vol. 30, No.5, pp. 517-541.

Levin, D., &Arafeh, S. (2002). *The digital disconnect: The widening gap between Internet-savvy students and their schools [Report]*. Washington, DC: Pew Internet & American Life Project. Retrieved September 6, 2005, from http://www.pewinternet.org

Li, Q. (2002). Gender and computer-mediated communication: An exploration of elementary students' mathematics and science learning. *Journal of Computers in Mathematics and Science Teaching,21*(4), 341–359.

Lockwood, Fred and Gooley, Anne. (2001) *Innovation in open and distance learning: Successful development of online and web-based learning*. London: Kogan Page Ltd.

Lockwood, Fred and Gooley, Anne. (2001) *Innovation in open and distance learning: Successful development of online and web-based learning*. London: Kogan Page Ltd.

Looker, D., &Thiessen, V. (2002, May). *The digital divide in Canadian schools: Factors affecting student access to and use of information technology.* Paper presented at the 2002 Pan-Canadian Education Research Agenda Symposium, Montreal, QC.

Maier, R. (2007): Knowledge management systems. 3rd Edition, Springer, Berlin.No.8/9, pp. 506-516.Perth, Western Australia.

McLean, S., & Morrison, D. (2000). Sociodemographic characteristics of learners and participation in computer conferencing. *Journal of Distance Education 15*(2). Available online [HREF6].

Miles, M. B. &Huberman, A. M. (1994) *Qualitative data analysis* (2nd Ed) Thousand Oaks,CA: Sage.

Mugenda, O.M and Mugenda, A.G (2003) Research Methods-Quantitative and Qulitative. Acts Press.

Nachmias Chava Frankfort and Nachmias David (1996*).* Research Methods in Social Sciences. 5th Edition*.* Arnold Publishers: London.

National Association of State Boards of Education. (2001). Any time, any place, any path, any pace: Taking the lead on e-learning policy. Alexandria, VA: author.

Neuhauser, C. (2002). Learning style and effectiveness of online and face-to-face instruction. *The American Journal of Distance Education 16*(2), 99-113.

Palloff, R. M., and Pratt, K. (1999). *Building Learning Communities in Cyberspace: Effective strategies for the online classroom*. San Francisco: Jossey-Bass.

Papp, R. (2001). Student learning styles and distance learning. *Proceedings of the 16th Annual conference of the International Academy for Information Management – International Conference on Informatics Education & Research*, New Orleans, Louisiana, USA, 14-20.

Powell, R, Conway, C., & Lynda, R. (1990). "Effects of students' predisposing characteristics on students' success." Journal of Distance Education. 4.2. 26-39.

Recker, M., Dorward, J., Dawson, D., Mao, X., Liu, Y., Palmer, B., Halioris, S., & Park, J. (2005). Teaching, designing, and sharing: A context for learning objects. *Interdisciplinary Journal of Knowledge and*

Roblyer, M. D. (1999). Is Choice Important in Distance Learning? A study of student motives for taking Internet-based courses at the high school and community college levels. *Journal of Research on Computing Education, 32*(1), 157 – 171.

Rodgers, T., &Ghosh, D. (2001). Measuring the determinants of quality in UK higher education: A multinomial logit approach. *Quality Assurance in Education*, 9, 121-126.

Roffe, I., (2002), *"E-learning: engagement, enhancement and execution"*, Quality Assurance in Education, Vol.10, No.1, pp.40-50.

Rosenberg, H., Grad, H. A., & Matear, D. W. (2003). The effectiveness of computer-aid, self-instructional programs in dental education: A systematic review of the literature. *Journal of Dental Education,67*(4), 524–532.

Rotter, J. B. (1989). Internal versus external control of reinforcement: A case history of a variable. American Psychologist, 45,489-493.

Sambrook, S. (2003), *"E-learning in Small Organizations."*Education + Training, Vol.45,

Schank, R.C., (2002), *"Designing World Class E-Learning"*, 1st ed., McGraw Hill, USA.

Schollie, B. (2001). Student Achievement and Performance Levels in Online Education Research Study. Edmonton, Alberta: Alberta Online Consortium.http://www.albertaonline.ab.ca/pdfs/AOCresearch_full_report

Shaw, G., & Marlow, N. (1999). The role of student learning styles, gender, attitudes and perceptions on information and communication technology assisted learning. *Computers &Education, 33*, 223-234.

Sheahan, J. (1987): Patterns of development in Latin America. Poverty, repression, and economic strategy. Princeton University Press, New Jersey.

Smith, D., & Hardaker, G. (2000). E-learning innovation through the implementation of an internet supported learning environment. *Educational Technology and Society*, 3, 1-16.

Stephenson, John, (2001). *Teaching and learning online: Pedagogies for new technologies*. London: Kogan Page Ltd.

Thatcher, J. B., and Pamela, L. P., 2002. An empirical examination of individual traits as antecedents to computer anxiety and computer self-efficacy. *MIS Quarterly*, Vol. 26.

Thomas, L., Ratcliffe, M., Woodbury, J., &Jarman, E. (2002). Learning styles and performance in the introductory programming sequence. *SIGCSE Bulletin, 34*(1), 33-37.

UN Human Rights (1948): Fiftieth anniversary of the universal declaration of human rights 1948-1998. Adopted and proclaimed by General Assembly resolution 217 A (III) of 10 December 1948, URL: http://www.un.org/Overview/rights.html.

Wang, A. Y. & Newlin, M. H. (2002). "Predictors of web student performance: the role of self-efficacy and reasons for taking online class. Computers in Human Behaviours, 8(2).151-163.

Wang, Y., Peng, H., Huang, R., Hou, Y., & Wang, J. (2008). Characteristics of distance learners: Research on relationships of learning motivation, learning strategy, self-efficacy, attribution and learning results. *The Journal of Open and Distance Learning, 23*(1), 17-28.

Wedemeyer, C.A. (1981). Learning at the back door: Reflections on non traditional learning in the lifespan. Madison: University of Wisconsin Press.

Wild, R.H., Griggs, K.A. and Downing, T, (2002), *"A framework for e-learning as a tool for knowledge management"*, Industrial Management & Data Systems, Vol.102, No.7, pp.371-380.

Woodley, A. & Parlett, M. (1983). "Students dropouts" in teaching at a distance, No.23, summer.

Yasin, K. &Luberisse, Y. (1997). Meeting the Needs of a New Democracy: Multichannel Learning and Interactive Radio Instruction in Haiti: A Case Study. Washington, DC: USAID. Online at http://ies.edc.org/pubs/book11.htm.

Zimmerman, B. J., and Risemberg, R. (1997). Self-regulatory dimensions of academic learning and motivation. In G. D. Phye (Ed.) *Handbook of Academic Learning: Construction of knowledge* (p. 105-125). San Diego, CA.: Academic Press.

Zywno, M. S., & Waalen, J.K. (2002). The effect of individual learning styles on student outcomes in technology-enabled education. *Global Journal of Engineering Education, 6*(1), 35- 44.

APPENDICES

APPENDIX A : Total population of the study

2018 - 2019 ASC REPORT										
		SS1			SS2			SS3		
LGA	NAME_SCHOOL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
BOSSO	BOSSO SECONDARY SCHOOOL MINNA	207	255	462	237	208	445	91	57	148
	DAY SECONDARY SCHOOL CHANCHAGA MINNA 'B'	129	104	233	131	136	267	97	80	177
	DAY SECONDARY SCHOOL MAITUMBI MINNA	164	200	364	184	200	384	120	90	210
	DAY SECONDARY SCHOOL PYATA BOSSO	39	48	87	95	82	177	103	90	193
	FEDERAL GOVERNMENT COLLEGE MINNA	168	140	308	171	170	341	151	117	268
	GOVERNMENT ARMY DAY SECONDARY SCHOOL	399	381	780	358	353	711	309	251	560
	GOVERNMENT SCIENCE COLLEGE CHANCHAGA	129	197	326	215	260	475	161	185	346
	GOVERNMENT TECHNICAL COLLEGE MINNA	466	60	526	450	63	513	279	58	337

	MARYAM BABAGIDA GIRLS SCIENCE COLLEGE	0	251	251	0	576	576	0	421	421
	MODEL SCIENCE COLLEGE TUDUN FULANI	83	99	182	80	92	172	62	54	116
	NIGER STATE SCHOOL FOR SPECIAL EDUCATION MINNA	25	12	37	27	10	37	20	11	31
	SHEIKH MUHAMMAD SANBO COLLEGE OF ARTS AND ISLAMIC STUDIES TUDUN FULANI MINNA	333	132	465	316	56	372	211	35	246
	SIR. AHMADU BELLO MODEL SECONDARY SCHOOL (HILL-TOP)	296	352	648	206	342	548	91	167	258
BOSSO TOTAL (MINNA METROPOLIS)		2438	2231	4669	2470	2548	5018	1695	1616	3311
CHANCHAGE	AHMADU BAHAGO SECONDARY SCHOOL MINNA	385	166	551	276	120	396	150	50	200
	DAY SECONDARY SCHOOL LIMAWA MINNA	482	273	755	343	188	531	346	253	599
	FR. O'CONNEL SCIENCE COLLEGE, MINNA	597	0	597	548	0	548	377	0	377
	GOVERNMENT DAY SECONDARY SCHOOL, BOSSO ROAD	336	40	376	534	33	567	166	8	174

	GOVERNMENT DAY SCIENCE COLLEGE TUNGA	320	350	670	396	480	876	179	319	498
	GOVERNMENT GIRLS SCIENCE COLLEGE, BOSSO ROAD MINNA	0	485	485	0	366	366	0	326	326
	GOVERNMENT GIRLS SECONDARY SCHOOL MINNA	0	840	840	0	1390	1390	0	1088	1088
	GOVERNMENT VOCATIONAL TRAINING CENTER	101	43	144	103	67	170	81	31	112
	WOMAN DAY COLLEGE	0	110	110	0	141	141	0	121	121
	ZARUMAI MODEL SCHOOL	263	174	437	223	164	387	93	52	145
CHANCHAGA TOTAL		2484	2481	4965	2423	2949	5372	1392	2248	3640

Source: PRS Department, Niger State Ministry of Education, 2019

OVERAL TOTAL = BOSSO + CHANCHAGA

= 12998 + 13977 = 26,975

APPENDIX B: Target Population of the study

2018 - 2019 ASC REPORT				
		SS2		
LGA	NAME_SCHOOL	MALE	FEMALE	TOTAL
BOSSO	BOSSO SECONDARY SCHOOOL MINNA	255	462	717
	DAY SECONDARY SCHOOL CHANCHAGA MINNA 'B'	104	233	337
	DAY SECONDARY SCHOOL MAITUMBI MINNA	200	364	564
	DAY SECONDARY SCHOOL PYATA BOSSO	48	87	135
	FEDERAL GOVERNMENT COLLEGE MINNA	140	308	448
	GOVERNMENT ARMY DAY SECONDARY SCHOOL	381	780	1161
	GOVERNMENT SCIENCE COLLEGE CHANCHAGA	197	326	523
	GOVERNMENT TECHNICAL COLLEGE MINNA	60	526	586
	MARYAM BABAGIDA GIRLS SCIENCE COLLEGE	251	251	502
	MODEL SCIENCE COLLEGE TUDUN FULANI	99	182	281

	NIGER STATE SCHOOL FOR SPECIAL EDUCATION MINNA	12	37	49
	SHEIKH MUHAMMAD SANBO COLLEGE OF ARTS AND ISLAMIC STUDIES TUDUN FULANI MINNA	132	465	597
	SIR. AHMADU BELLO MODEL SECONDARY SCHOOL (HILL-TOP)	352	648	1000
BOSSO TOTAL (MINNA METROPOLIS)		2231	4669	6900
CHANCHAGE	AHMADU BAHAGO SECONDARY SCHOOL MINNA	166	551	717
	DAY SECONDARY SCHOOL LIMAWA MINNA	273	755	1028
	FR. O'CONNEL SCIENCE COLLEGE, MINNA	0	597	597
	GOVERNMENT DAY SECONDARY SCHOOL, BOSSO ROAD	40	376	416
	GOVERNMENT DAY SCIENCE COLLEGE TUNGA	350	670	1020

	GOVERNEMENT GIRLS SCIENCE COLLEGE, BOSSO ROAD MINNA	485	485	970
	GOVERNMENT GIRLS SECONDARY SCHOOL MINNA	840	840	1680
	WOMAN DAY COLLEGE	43	144	187
	ZARUMAI MODEL SCHOOL	110	110	220
CHANCHAGA TOTAL		4962	9930	14892
		7193	14599	

Source: Niger State Ministry of Education, 2019

OVERAL TOTAL = BOSSO + CHANCHAGA

= 6900 + 14892 = 21792

APPENDIX C: Sample of the Study

S/N	GROUPS	NAME OF SCHOOLS	L.G.A	NO. OF CLASSES	M	F	TOTAL
1	Experimental	Army Day Secondary Science, Tunga	Bosso	1	98	99	197
TOTAL FOR EXPERIMENTAL GROUPS							197
3	Control	Government Day Science College, Tunga	Chanchage	1	98	98	162
TOTAL FOR CONTROL GROUPS							196
OVERALL TOTAL					196	197	393