**EXTENT OF THE USE OF AUDIOVISUAL MATERIALS IN TEACHING AND LEARNING OF MATHEMATICS IN OJI RIVER LOCAL GOVERNMENT AREA,**

**ENUGU STATE**

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**JULY 2018**

**TITLE PAGE**

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 **DEPARTMENT OF SCIENCE AND VOCATIONAL EDUCATION, FACULTY OF EDUCATION, GODFREY OKOYE UNIVERSITY,**

**UGWUOMU-NIKE ENUGU STATE.**

**A RESEARCH WORK SUBMITTED TO THE DEPARTMENT OF SCIENCE AND VOCATIONAL EDUCATION,FACULTY OF EDUCATION, GODFREY OKOYE UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF SCIENCE IN EDUCATION (B.Ed)**

**JULY, 2018**

**CERTIFICATION PAGE**

I Nnadika Nnetachukwu Peace, a degree student in the department of Science and Vocational education with the registration number: U16/EDU/MAT/009 has satisfaction completed the requirements for this research work "Extent of the use of audiovisual materials in teaching and learning of mathematics" for the award of bachelor of Science in Education B.Sc (Ed) (Mathematics Education). The work contained in this project report is original and has not been submitted in part or full for any diploma or degree of this or any other university.

……………………………… .......................

Nnadika Nnetachukwu Peace Date

**APPROVAL PAGE**

This project has been read, examined, collected and approved as meeting the requirement for the award of Bachelor of Education (B.Ed) in the department of Science and Vocational Education (Mathematics Education Programme) of Godfrey Okoye University Enugu.

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 **DEDICATION**

This project work is dedicated to the Almighty God for his love, favour, grace, guidance and protection throughout this academic journey.

**ACKNOWLEDGEMENT**

I wish to express my immense gratitude to God almighty, for his love, favour, grace, guidance and protection throughout this academic journey. My appreciation goes to my able supervisor Mr Ozomadu for his contibutions and direction throughout the period of this work, I recognize the effort of the Head of department, science and vocational education, Prof Uche Agwagah and my honourable lecturers Professor ochor, Mr/Mrs Ezugorie, Mr benson, Mr. Anaeche, Dr. Ugwunnadi, Dr. Anabanti, Dr Agbebako, for been there for me at all times.

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 I must extend a handshake to my dear friends and colleagues Ezievuo Chinwendu, Lemchi Chiamaka, Johnson Amarachi, Nzekwe Ujunwa, Chukwu Augustine, Ene Chinelo, Azike lucky, Anyalowu Onyedika Nnaji Harrison, Okolo Assumpta, Udeogu Chikaodili, Ene Sochima and the entire graduating students of Godfrey Okoye University most especially faculty of Education.

Finally, to others too numerous to mention, may God bless you, and I love you.

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**Abstract**

The purpose of the study is the extent of the use of audiovisual materials in teaching and learning of Mathematics in Oji River Local Government Area, Enugu State. The population of the study consisted of 1668 students of four public secondary schools and fifteen mathematics teachers. The sample was drawn using simple random sampling technique, out of 11 public secondary schools in Oji river local government Area, 4 schools were randomly selected for the study, Fifty (50) students from each school were selected and 15 teachers making it a total of 215 as the sample size. Three research questions were formulated. The data were collected using questionnaire and observation. Validation of the instrument was face validity. Validation was made by 2 experts in measurement and evaluation and mathematics from Godfrey Okoye University in Enugu State. The questionnaires were administered to the students and mathematics teachers and were collected by the researcher. The reliability of the instrument was tested using Cronbach's Alpha with the result 0.9 which shows that the instrument was reliable. The data were analysed using mean for research question and t test calculation for testing the hypothesis. Findings from the analysis showed that audiovisual materials in teaching and learning of mathematics are not available in some schools in oji river local government area in Enugu state, it is also observed that the extent to which audiovisual materials are used in teaching and learning of Mathematics is low in schools, it also reveals that female teachers effectively use audiovisual materials in teaching and learning of mathematics more than the male teachers in Oji river local government Area in Enugu state. And recommend that Government / Ministry of Education should provide audiovisual materials for all the public schools in Oji River Local Government Area in Enugu State.

 **CHAPTER ONE**

 **INTRODUCTION**

**Background of the study**

Mathematics is a compulsory subject which cut across every human facet, and is equally used in every field of human endeavor; it also play a dominant role in the economic development of a country. The significance of Mathematics in producing versatile and resourceful leaders that are needed for economic development cannot be over emphasized. This is why Setidisho (2000), affirmed that Mathematics is a fundamental science that is necessary for the understanding of most other fields in education. Setidsho stressed further that, it is obvious that no other subject forms such a strong force among the various branches of science. Therefore, it can rightly be said that the significance of Mathematics in producing versatile and resourceful leader that are needed for economic development cannot be over-emphasized.

Odusoro (2002) said that the knowledge of science remains superficial without Mathematics. It has been recorded that less than 20% of students venture into mathematics as their discipline. The West Africa Examination Council (WAEC) according to Adenipekun (2017) said that only 26.01 percent , obtained credit in Mathematics, while the remaining candidates failed. Adenipekun disclosed that the result showed a decline in the percentage of candidates who made credit in mathematics, compared to the last two years. The study of mathematics is generally considered as a basic preparation for every informed citizen because it serves as a gateway into almost all the career choices in life (Ambrose 2003). This may be why Soyemi (2005) said that everybody uses Mathematics in one way or the other in solving real life problems. Obodo (2006) defined Mathematics as the study of size, numbers, shape, changes with the relationship between them. This is why nations that desire to forge ahead scientifically and technologically cannot afford to toy with the Mathematical knowledge of her citizenry. This may be why stakeholders in mathematics Education always show concern about students’ mass failure in the subject at the public examinations. Despite the importance of mathematics, learners continue to fail the subject(Feza, 2012). Maree,(2006) reveal that the failure rate in mathematics in schools is unacceptably high.

Despite the importance attached to the knowledge of mathematics, it must be understood that mathematics is mostly poorly performed subject in the secondary schools today. This is based on the fact that mathematical concept are sometimes not presented well and interesting. It has become discouraging to note that, the poor use of audiovisual materials affects students performance negatively ,in different mathematical concepts. some of which is geometry, which deals with shapes and can be taught with different mathematical aids, such as the use of fun mathematics, computer game, mathematics game etc. The use of mathematics games such as geoboard games can make mathematics teaching and learning very interactive, interesting, promote retention and aid student based learning where the students are exposed to real shapes and designs, where the students can make use of the rubber bands to map out different shapes on their own. Sadly enough most teachers don't make use of audiovisual materials; some are not computer literate, which brings a very big gap in the understanding of the students.

The notion among students that mathematics is an abstract and difficult subject can be attributed to the fact that mathematics teachers do not frequently make use of audiovisual materials.

Researches show that students spend more than 4-5 hours a day in front of media such as television, video, computer, internet, movie, radio, tape, video games and phones etc,(Gridina 2000). It is the belief of the researcher that if students spend such time in relevant topics in mathematics, it will go a long way in helping in the study of mathematics. It is also believed that audiovisual aids may be useful in secondary schools as long as they are used with awareness. In our state, computers are made accessible to students by government to enhance their teaching and learning, thereby making it suitable for the use of audiovisual in teaching and learning.

Ilogu (2005) submitted that students learn in a variety of ways, and their ability to assimilate information also varies, A student’s capacity to learn is impacted by the teacher’s style of conveying information, that is, the teaching methodology adopted by the teachers to facilitate learning processes.

Despite the fact that chalkboard which is not an audiovisual material has been in use for a long time, it has not created the required impact in the teaching and learning of mathematics but if audiovisual materials such as computer games, videos, projectors, computers, clips, fun mathematics. are included, it may lead to a better understanding of mathematics. This is why the researcher decided to carry out the research on the topic the extent of the use of audiovisual materials in teaching and learning of mathematics.

The effective use of audiovisual materials in teaching and learning of Mathematics can make the subject practical, interesting and enjoyable. Audiovisual can be defined as instruction where particular attention is paid to the audio and visual presentation of the materials, with the goal of improving the comprehension and retention of students.

Dike, (2003) defined audiovisual materials as; those materials which do not depend solely upon reading to convey meaning. They may present information through the sense of hearing as in audio resources, sight, as in visual resources or through a combination of senses. Indeed, the variety of such resources is a striking feature. According to Anzaku,(2011) “the term audiovisual materials is commonly used to refer to those instructional materials that may be used to convey meaning without complete dependence upon verbal symbols or language”. Anzaku further stated that audiovisual materials include materials and equipment alike that materials are considered to be system, or body of content of potential value when put to work, while equipment or instructions, often referred to as hardware, components, are the means of presenting such content.

Webster’s Encyclopedia Unabridged Dictionary of the English Language(2008), defined Audiovisual Aids as “training or educational materials directed at both the senses of hearing and the sense of sight, films, recordings, photographs, etc used in classroom instructions, library collections or the likes.”

 Ngozi, (2012) agreed that audiovisual materials are very important and useful in education because, the normal learner in so far as the functions of the preceptor mechanisms are concerned, gains understanding in terms of multiple impression recorded through the eye, ear, touch and other series. This is to say that audiovisual materials are the equipment through which that function can occur, that is, it does not occur in isolation, rather through a balance pattern from any preceptor mechanism that are stimulated by external occurrences.

Furthermore, Oketunji,(2000) stressed that audiovisual materials when effectively used have these advantages. They lessen major weakness of verbalism, and vitalize subject matter, provide interesting approach to new topics and give initial correct impressions, supply concrete materials needed, stimulate the initiative of the students. Swank,(2011) stressed the effectiveness of audio visual materials in leaning, estimated that about 40% of o concepts are based upon visual experience, 25% upon auditory, 17% on tactile, 15% upon miscellaneous organic sensation and 3% upon taste smell. However, it is not certain by researchers whether schools were effectively utilizing the opportunities in the use of audiovisual. It is against this backdrop however that the study becomes

**Statement of the Problem**

Evidence of mass failure in mathematics by students point to the fact that the teaching and learning materials are not effectively used in mathematics classes or are not available in the school, the inability of teachers to make the subject practical due to the abstract nature of mathematics.

The modern world use digital tools, to improve teaching and learning process, the use of audiovisual materials makes teaching and learning interactive, interesting, and enhances retention and understanding for a longer period, the lack of the use of audiovisual materials or availability of audiovisual materials could be the course of low performance or failure of students in mathematics.

**Purpose of the Study**

The purpose of the study is to find out the extent of the use of audiovisual materials in teaching and learning of Mathematics in public secondary schools in Oji River Local Government Area, Enugu state.

 Specifically, the study sought to find out the following;

i) The availability of audiovisual materials in teaching and learning of Mathematics.

ii) The extent of the use of audiovisual material in teaching and learning of Mathematics.

iii) The extent to which male and female teachers effectively use audiovisual materials in teaching and learning of mathematics.

**Significance of the Study**

The result of the findings would be beneficial to students, teachers, researchers, curriculum planners and even publishers.

This study considered Dale's cone of experience and Robert gagne's nine levels of experience. Dale's cone of experience was propounded by Edgar Dale in the 1960s, according to Dales cone learners retain more information by what they “do” as opposed to what is “heard”, “read” or “observed”. It reveals that “action-learning” techniques result in up to 90% retention, people learn best when they use perceptual learning styles, perceptual learning styles are sensory based. The more sensory channels possible in interacting with a resource, the better chance that many students can learn from it. Audiovisual materials is sensory based, which involved the perceptual learning style, the use of audiovisual materials convert the abstract nature of mathematics to real experience, thereby making mathematical concept practical and concretize knowledge.

Robert Gagne (1916–2002) was an educational psychologist who pioneered the science of instruction in the 1940s. According Gagne's nine levels learning model

 Gaining attention, informing learners of the objective, stimulating recall of prior learning, presenting the stimulus, providing learning guidance, eliciting performance, providing feedback , assessing performance, enhancing retention and generalization, help students in retaining information, by providing materials like graphics, games, and computers. Audiovisual materials covers, the Gagne's nine levels of learning model, students attention is gained and retained through the use of audiovisual materials, presentation of materials like game computer and graphics are made possible through the use of audiovisual materials.

This study was also significant in showing the reality of mathematics to learners in secondary schools. Students would be able to understand the implication of mathematics in their daily activities which would impact on and change any negative attitude towards the subject. The frequent use of audiovisual materials would enhance learning by making mathematics more concrete and real, leading to better understanding of mathematical concepts.

The findings of this study would help mathematics teachers to develop classroom competence by helping them to use a wide variety of audiovisual materials in their lessons other than the conventional ones, and that it is important to involve their learners in this teaching and learning process.

The findings of this study would enable the curriculum planners to develop and avail enough, quality and audiovisual materials for proper teaching of mathematics.

The findings of this study, if discussed in workshops and seminars will guide the choice of materials used in the teaching/learning process in mathematics.

This study will be of great importance to the researchers, because it `will serve as a reference materials.

**Scope of the Study**

The study is restricted to public senior secondary school students (SSS1- SS3) in Oji River Local Government Area in Enugu State. The study also limited its scope on the extent of the use of audiovisual Materials in teaching and learning of mathematics which includes interactive whiteboard, mathematics and computer games, computers, projectors, video tapes, internet access, flash cards, illustrated mathematics books and mathematical charts and pictures.

**Research question**

For the achievement of the objective of the study, the following research questions were formulated to guide the study.

I) To what extent are mathematics audiovisual materials available in teaching and learning ?

ii) To what extent are audiovisual materials used in teaching and learning of Mathematics?

iii) To what extent do male and female teachers effectively use audiovisual materials in teaching and learning of mathematics?

**Research Hypothesis**

 There is no significant difference on the extent male and female teachers effectively use audio visual materials in teaching and learning of mathematics.

**CHAPTER TWO**

**REVIEW OF RELATED LITERATURE**

This chapter was discussed under the following headings:

Conceptual framework

* Concept of Audiovisual materials
* Concept of teaching and learning of Mathematics
* Attitude of teachers towards the use of audiovisual materials

Theoretical framework

* Dale's cone of experience
* Robert Gagne's nine levels of learning

 Empirical studies

* Waguru,(2015) researched on challenges facing teachers in utilizing instructional resources when teaching mathematics.
* Billman, (2014) researched on technology in mathematics
* Adedayo, (2014) Availability of basic teaching/learning materials.
* Taiwo, (2009) researched on evaluation on teachers perception of the role of media in classroom teaching in secondary schools.
* Edeh, (2016) researched on causes of inadequate use of instructional materials in teaching and learning of mathematics

 Summary of review of related literature

**Concept of Audiovisual Materials**

Audio is a sound within the acoustic range available to humans. Visual was defined by Cambridge dictionary (2018) as something such as pictures, photographs or piece of films used to give a particular effect or to explain something.

According to Merriam dictionary(2018), Audiovisual isdesigned to aid in learning or teaching by making use of both hearing and sight or relating to both hearing and sight. Audiovisual means possessing both a [sound](https://en.wikipedia.org/wiki/Sound) and a [visual](https://en.wikipedia.org/wiki/Visual) component, such as [slide tape](https://en.wikipedia.org/wiki/Slide-tape) presentations, [films](https://en.wikipedia.org/wiki/Film), [television programs](https://en.wikipedia.org/wiki/Television_program), church services and live theater productions.

Audiovisual aids are those instructional devices which are used in the classroom to encourage learning and make it easier and interesting such as charts, maps, models, film strip, projectors, radio, television. Rather,(2004). Audiovisual aids are effective tool that provides the learners with realistic experience, which capture their attention and help in the understanding of the historical phenomena. They appeal to the mind through the visual auditory senses.

Jain, (2004) stated a famous Chinese proverb “one seeing is worth, a hundred words”. It is fact that people receive knowledge through the senses. There is another proverb that” if we hear we forget, if we see we remember, and if we do something we know it” so it means that the use of Audiovisual materials make teaching learning, process more effective. As Kishore (2003) said “Audiovisual materials stimulate thinking and understanding.” The use of audiovisual aids in teaching, learning process has multifarious values (Mohanty, 2001). Audiovisual materials give chance to speakers to make a more professional and consistent presentation. The teaching profession is filled with countless opportunities to enrich the academic lives of students, while some concepts and educational objectives will be easy for students to grasp, other will require you to think creatively to ensure that important learning objectives are met. Using Audiovisual materials in teaching is one way to enhance lesson plans and give students additional ways to process subject information (Kunari,2006). Audiovisual materials are devices that present knowledge through auditory of visual stimuli both with a view to help learning. They concretize the knowledge to be presented and help in making learning experience appear real, living and vital. The great educationist Comenius has well said: The foundation of all learning consists in representing clearly to the senses and sensible objects so they can be appreciated easily (Singh,2005).

Eze (2013) also state that the human being learns more easily and faster by audio-visual processes than by verbal explanations alone. The ability to arrive at abstract concept through perceptual experience is however a phenomenon not clearly explained and perhaps not explicable. Furthermore, Oketunji (2000) stressed that audiovisual materials when effectively used have these advantages: they lessen major weakness of verbalism, humanize and vitalize subject matter, provide interesting approach to new topics and give initial correct impressions, economic time in learning, supply concrete materials needed, stimulate the initiative of the students, extending experience. Gopal ( 2010) stressed that audiovisual materials help the teacher to overcome physical difficulties of presenting subject matter. That is to say, with audio-visual materials, the barrier of communication and distance is broken. The culture and climatic conditions of other countries can be brought into the classroom with the aid of slides, films, filmstrips and projectors. This is important because, according to Gopel, (2010) the phenomenon is visualized, the picture and knowledge becomes very clear. Encouraging Participation, Natoli (2011) audiovisual materials are rich opportunities for students to certainly like it more and learn better if they are engaged in important and appealing activities . For example, involving students in bulletin board display will enhance their choice of colour and aid their understanding of the concept in question or when they join the teacher in dramatization of an event or a process.

 Stimulating Interest, Katherine (2009) opined that learning takes place effectively when the teacher sets out to provide learning situation in which a child will learn because of the natural reactions of the provided materials”. During the process of learning, the teacher has to provide the learning situation to satisfy the natural reaction of the learner and this is through the use of instructional aids. The attention of the learner is caught and the interest is also won and the learner is ready to learn. Lestage (2012) stressed that audiovisual materials provide a means of individualizing instruction. lestage said it is possible through programmed learning and tapes which enable the learner to learn at his pace and also to work on his own. Moreover, according to Dike (2003) the machine frees the teacher to work with individual students. Mcnaught (2007) also observed that audiovisual materials are very useful teaching and instructional, as well as promotional aids. Mcnaught further stressed that where consistency of presentation is desirable, audiovisual materials are useful. They provide experiences not easily secured in other ways and hence contribute to the depth and variety of learning. Audiovisual resources can play a major role of making learning permanent.

According to Gopal (2010) audiovisual materials facilitate the acquisition, the retention and the recall of lessons learned, because, they seem to evoke the maximum response of the whole organism to the situations in which learning is done and lack of those materials make students loose interest in the concept. And perceptual materials readily associate themselves with the unique experiential background of each individual. Natoli (2011) stressed that audiovisual materials are important in the teaching and conjures up an image at a mere mention and can be talked about freely. Dike (2003) also explained that students forget because of lack of interest and opportunities to use the knowledge they have gained later on. Audiovisual resources can therefore contribute to the clarity of information presented by allowing students to visualize what is learned. Thus the saying: What I hear, I forget What I see, I remember What I do, I understand.

An interactive whiteboard is an instructional tool that allows computer images to be displayed on to a board using a digital projector. An interactive whiteboard is a relatively new tool that provides interesting affordances in the classroom environment, such as multiple visualization and multimedia presentation and ability for movement and animation. These affordances make interactive whiteboard an innovative tool with high potential for mathematics instructional environments. Interactive whiteboard can be used to focus on the development of specific mathematical concepts and to improve mathematical knowledge and understanding. The capabilities of IWBs to enhance the quality of interaction, and, consequently, to improve conceptual mathematical understanding are broadly recognized. Despite these capabilities, Somekal (2003) revealed that with more exposure to IWBs in mathematics students on average made greater progress. Mathematics has always been, and is still, a subject of considerable importance in schools. Often mathematics lessons show a lack of variety, with typical lessons concentrating on the acquisition of skills, the solution of routine exercises and preparation for tests and examinations. Teachers can use IWBs for modeling mathematical ideas and strategies, demonstrating theorems, explaining difficult concepts, stimulating discussion about relevant mathematical topics, inviting interpretations of what is displayed, and challenging students to apply their mathematics to solve problems .Good practice in mathematics education includes the use of high quality diagrams and relevant software to support learning through, for example, construction of graphs or visualization of transformations. The IWBs’ affords, especially the capacity to present a wide variety of multimedia resources, the ability for movement and animation to demonstrate principles and to illustrate explanations, the possibility to match different representations (geometrical and algebraic) may favour enhancements in teaching and learning.

 Mathematics learning is an essentially constructive activity. Learners need to engage in the processes of mathematical thinking: framing and solving problems, looking for patterns, making conjectures, examining constraints, abstracting, inventing, explaining, justifying, challenging, and so forth. In this respect, the interactive affordances of the IWB can be exploited to promote the learners’ active involvement in these mathematical thinking processes through the use of a more interactive pedagogy.

Game means to engage in activity directed toward bringing about specific state of affairs, using only means permitted by specific rules, where the means permitted by the rules are more limited in scope than they would be in the absence of the rule, and where the sole reason for accepting such limitation is to make possible such activity. (Bernard, 2009).

 Rutherford (2015), maintained that People of all ages love to play games that are fun and motivating. Games give students opportunities to explore fundamental number concepts, such as the counting sequence, one-to-one correspondence, and computation strategies. Engaging mathematical games can also encourage students to explore number combinations, place value, patterns, and other important mathematical concepts. They afford opportunities for students to deepen their mathematical understanding and reasoning.

Games are an important tool for learning in secondary school mathematics classrooms. Playing games encourages strategic mathematical thinking as students find different strategies for solving problems and deepen their understanding of numbers. When played repeatedly, games support students’ development of computational fluency, games present opportunities for practice, often without the need for teachers to provide the problems. Teachers can then observe or assess students and work with students, Games have the potential to allow students to develop familiarity with the number system and with benchmark numbers and engage in computation practice, building a deeper understanding of operations, Games support a school-to-home connection. Parents can learn about their children’s mathematical thinking by playing games with them at home.

Mathematical games develop mathematical communication as students explain and justify their moves to one another. In addition, games can motivate students and engage them in thinking about, and applying, concepts and skills. Games give students an opportunity to communicate their ideas and justify their thinking. In using games, the teacher plays an important role in encouraging students to explain their thinking and in keeping them focused on mathematical ideas. Asking them to explain and justify their moves during a trial round of the game played as a whole class demonstrates the type of thinking and communicating that is important for students to use later when they play the game. Mathematical games provide a unique opportunity for integrating the cognitive, affective and social aspects of learning. Teachers should provide repeated opportunities for students to play games, then let the mathematical ideas emerge as students notice new patterns, relationships, and strategies.

 Games involving pairing cards can be very flexible. For instance the pairs of cards can form the two halves of an equation, marked with two equivalent fractions or a percentage and its decimal equivalent.

A geoboard is a graph board with pins or nails at each point where the horizontal and vertical lines cross each other obodo(2006).The geoboard can be used in playing many games for varied and specific mathematical activities such as to represent geometric pattern, with rubber bands of different colours, geoboard

Punch card is a game that teaches multiplication, addition, subtraction, and division. Where the first player shows the other players a card, then they give answers to the question, if correct you will be congratulated but if wrong, at the back of the card is the right answer.

Computer is derived from a Latin word computare which means "to calculate", "to count", " to sum up" or "think together" so the word computer means a device that performs computation (Jaward 2013). Computer is an electronic device which is capable of receiving information (data) in a particular form and performing a sequence of operations in accordance with a predestined but variable set of procedural instructions to produce result in the form of information.

Computer is a very suitable tool to provide opportunities for students to learn, through the use of computers, students can have access to the eBook or notes, spreadsheet and database, computerized graphing, different software's such as computer algebra system, dynamic geometry systems, math's curriculum software's, educational blogs and site etc.

Studies have shown that a range of portable devices exist which allow students to

collect data and manipulate it using spreadsheet and database for numeracy (Moseley 2002).

The use of computer has made it possible for students to have a platform where they get to interact with other students, professionals in mathematics to ask “why" what" or “how” problems are to be solved or to understand difficult mathematical concept. Papert (2000) pointed out that educationist has to change its attitude towards the learning process. A shift is seriously needed from quantitative knowledge towards qualitative one. The important thing, then, is not to have more knowledge but doing something with the existing knowledge. computer makes the teaching and learning of mathematics, practical, interactive, concretize knowledge, and help retain understanding.

Projector is an output device that can take images generated by a computer or blue gray reproduce them on a screen, wall, or other surface. Projector is an optical device that projects a beam of light, especially one used to project an image. Projectors help in Interactive teaching, which keep students engaged in the mathematics class. It’s much easier to concentrate on a topic when one is playing an active role. When students are working together in front of the class, they are likely to take participation more seriously. An interactive projector can be a valuable tool for increasing engagement in mathematics classes, even if the students stay in their seats, watch videos together, take online pop quizzes or view real-time information on the topics discussed.

Projectors help the teacher make better use of time in the classroom: Teachers would have to get into class early to write up notes, and constantly erase and rewrite content on the board as the lesson progressed. These regular disruptions often cause students to lose interest, or start chatting among themselves as they waited for the next part of the lesson. Then, more time would be wasted on classroom management.

### Video tapes are magnetic tapes used for storing video and usually sound in addition. Information stored can be in the form of either an analog or digital signal.

### Video tapes serve as a Flexible Teaching Medium in the teaching and learning of mathematics,

 The more interested and engaged students are, and the more interactive each learning session is, the more students will enjoy, learn from and retain information from the lesson.

Video provides a means of interactive instruction and is a very flexible medium. Having the ability to stop, start and rewind is absolutely invaluable. It provides the option to stop each video and challenge students to predict the outcome of a demonstration, and solve problems. Teachers and students also have the option to rewind a section of the video to review a segment to ensure that students understand a topic. The teacher can ensure to add further interactivity by copying activities, conducting discussions or repeating demonstrations and experiments in the classroom.

The Internet is the global system of interconnected computer networks that use the Internet protocol suite (IP) to link devices worldwide. It is a network of networks that consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies. The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), electronic mail, telephony, and file sharing .

The contemporary society is ever-changing, it is characterised by new ways of learning, primarily through use of the Internet (Kerry, 2000). The Internet allows learners to ask questions or share ideas with teachers and friends via electronic mail (James, 2001), to do hands-on activities using Internet-based manipulative, (Crawford, 2003), to engage in collaborative-projects with other students in different countries (James, 2001), to collaborate in discussion forums. (Yang,2002), to ask questions directly of experts, or to obtain primary resources (Kerry, 2000). With the Internet, activities which previously required students to be physically present in the classroom can now be done virtually without attending classrooms (Bellon, & Foster, 2003).

Pictures are drawings of real objects and can be used to teach mathematics topics like common solids, three-dimensional geometry, surveying and many others. Drawings can be done on manila sheets and hang on classroom walls for teaching different concepts. Charts are essential visual summaries of information in the teaching learning process. Charts can bring out steps in mathematics problem solving. Pictures and charts serve different purposes in teaching. Whereas pictures help to illustrate and bring a sense of reality to what is taught, charts contain the lesson material itself. While pictures are used to stimulate interest, create correct impressions and bring lessons to life, charts are more useful as a means of presenting the material that is to be learnt in a memorable form and as such often play a central role in a lesson or a concluding part (Farrant, 2004).

**Concept of teaching and learning of mathematics**

Mathematics is the study of quantity, structure, space, and change. Mathematics is the science that is developed from the investigation of figures and computing with numbers. For mathematics, there is no commonly accepted definition; today it is usually described as a science that investigates abstract structures that it created itself for the properties and patterns. Elaine (2013) defined mathematics as the science that deals with logic of shape, quantity and arrangement. Mathematics is all around us, in everything we do. It is the building block for everything in our daily lives including mobile devices, architecture, art, money, engineering, and even sports.

Teaching can be defined in different ways and in different perspectives and from different people. According to Nwaegbu (2001), teaching is an act of transmitting information from sender to receiver and from the receiver back to the sender.

Nwachukwu (2000) opined that it is a process which a child or every individual passes through the cradle from the day he was born till the time the individual gets into the grave. However Goble and Porter (2003) saw teaching as an act of giving instruction or information about something to somebody. Goble and Porter still maintain it is an act or knowledge about something to impart such knowledge to the individual with lesser person to help the individual for further purpose.

A teacher who believes that information can be transmitted to students’ heads often employs lecture methods in the teaching of mathematics. These teachers usually stand up in front of the class, writing formulas on the board, and providing several examples for practising the formula. Teachers then give students many exercises for practice and expect students to memorize the formula Hüvelmeyer,( 2003).Yet several studies have described the detrimental effects of this approach for students (Glazer, 2001). Because of a tendency for teachers to expect students to memorise a lot of facts that may not necessarily make sense to them, and asking students to listen and practice many exercises in preparation for a test, many students come to the conclusion that mathematics is either about right or wrong, it is unrelated to real life, or it is only appropriate for smart students. This means that the way a concept is presented to the student by the teachers have a long way in the students' performance.

Onwu (2001) defined learning as a relative permanent change in behavior which occur has a result of experience, training, practice or interaction with the environment. He stated further that learning is an active process and acquisition of new responses, ideas, skills, knowledge and perception has a result of the interaction with environment. Eke (2003) stated that learning is a process of adapting to and improving the environment, and there is continuity in learning which builds on experience and practice.

**Attitude of teachers towards the use of audiovisual materials**

Attitude can be defined in different ways: Attitude is a state of influence or modifies the individual choice of personal action. Turkma (2000), defined attitude as a system of positive or negative evaluation, emotional feeling and poor connection tendencies with respect to social object. Anih (2001) defined attitude as the way an individual feels, thinks and is predisposed to act towards some aspect of the environment. Thus it may said that the way teachers feel, think and act towards the use of audio visual materials in the teaching and learning of mathematics affect the extent of the use of audio visual materials in teaching and learning of mathematics. Researchers have generally shown that teachers influence affects student’s attitude towards the subject. It is observed that the behavior of most mathematics teachers deviate from the expected normal behavior of teachers. They tend to exhibit very queer characteristics which scare many students away from studying mathematics. Sperling (2002), opined that some mathematics teachers create the impression to students that mathematics is very difficulty by not making proper use of practical strategies and concrete ways to help students grasp mathematical concepts, improve their proficiency and generalize knowledge in multiple contexts. According to Rukangu (2013), practical work is important in teaching and learning of mathematics, Proper understanding of concepts being taught requires that they be concretized through the use of suitable experimental/practical work, teaching aids and real life experiences. It is now left for teachers to develop a positive mindset towards the use of audiovisual materials in teaching and learning of mathematics, It is an established fact that one is more likely to remember/internalize what is done than what is seen or hear. Practical work in mathematics ensures learners‟ participation, variation of stimuli and good performance in mathematics. Based on the above fact teachers are meant to have a good attitude towards the use of audiovisual materials for good understanding amongst students.

Poor attitude towards the use of audiovisual materials is mostly shared by teachers who had their training before the start of the computer age who have the most negative attitudes towards its pedagogical use and who insist on using the traditional modes of teaching. Most prevalent and widening attitude of teachers is the realisiation and acceptance of the importance of the use of audiovisual materials in teaching and learning of mathematics.

Nwaegbu (2001) maintained that another problem over the use of instructional materials is the attitude of the teachers who will never make out time to use these teaching materials even when they are at hand, they feel so busy and full of themselves to present them in their classes while teaching not to talk of providing even the least of them.

**Theoretical framework**

**Dale’s Cone of Experience and Robert Gagne's Nine Levels of learning model**

Dale’s Cone of experience is a model that incorporates several theories related to instructional design and learning processes. During the 1960s, Edgar Dale theorized that learners retain more information by what they “do” as opposed to what is “heard”, “read” or “observed”. The research led to the development of the Cone of Experience. Today, this “learning by doing” has become known as “experiential learning” or “action learning”.



According to Dale’s research, the least effective method at the top, involves learning from information presented through verbal symbols, i.e., listening to spoken words. The most effective methods at the bottom, involves direct, purposeful learning experiences, such as hands-on or field experience. A direct purposeful experience represents reality or the closet things to real, everyday life.

The cone charts the average retention rate for various methods of teaching. The further one progresses down the cone, the greater the learning and the more information is likely to be retained. It also suggests that when choosing an instructional method it is important to remember that involving students in the process strengthens knowledge retention.

It reveals that “action-learning” techniques result in up to 90% retention. People learn best when they use perceptual learning styles. Perceptual learning styles are sensory based. The more sensory channels possible in interacting with a resource, the better chance that many students can learn from it. According to Dale, teachers should design instructional activities that build upon more real-life experiences.

Robert Gagne (1916–2002) was an educational psychologist who pioneered the science of instruction in the 1940s. His book "The Conditions of Learning," first published in 1965, identified the mental conditions that are necessary for effective learning.

Gagne's Nine Levels of Learning model gives trainers and educators a checklist to use before engaging in teaching or training activities. Each step highlights a form of communication that aids the learning process. When each step is completed in turn, learners are much more likely to be engaged and to retain the information or skills that they're being taught.

 Gagne's Nine Levels of Learning model is as follows:

Level 1: Gaining Attention (Reception)

Level 2: Informing Learners of the Objective (Expectancy)

Level 3: Stimulating Recall of Prior Learning (Retrieval)

Level 4: Presenting the Stimulus (Selective Perception)

level 5: providing learning guidance (semantic encoding)

Level 6: Eliciting Performance (Responding)

Level 7: Providing Feedback (Reinforcement)

Level 8: Assessing Performance (Retrieval)

Level 9: Enhancing Retention and Transfer (Generalization)

The teacher should start the learning experience by gaining the attention of the learners. This change in stimulus alerts the group that learning will soon take place. Gain attention by raising the volume of voice, gesturing, showing a short video on the topic of instruction, or using any other event that brings the period of "waiting for the lesson to start" to an end. Inform Learners of the Objective (Expectancy). The teacher ensure that the students knows what they need to learn, and that they understand why they're about to learn the concept. Then, explain how their learning is going to benefit them, and the society.

When the students learn something new, match the new information with related information or topics they've learned in the past, ask the students if they have any previous experiences with the topic, or if they have experienced the problems that the training is trying to resolve. Then make connections between what they are learning, and their previous learning. The teacher present the new information to the group in an effective manner. Organize the information in a logical and easy-to-understand manner. Try to use a variety of different media and styles (such as visual cues, verbal instruction, games, clips and active learning) to suit student with different learning styles.

 To help students learn and retain the information, provide alternative approaches such as graphics, games, that illustrate the information that is provided. At this stage, there is need for the teacher to ensure that the students can demonstrate their knowledge of what they have been taught. After students demonstrate their knowledge, provide feedback and reinforce any points as necessary. Imagine that they have been taught a new technique for handling difficult concept. The students should be able to complete a test, or other measurement tool, to show that they've learned the material or skill effectively. Students should complete this test independently, without any help or coaching from the teachers.

 In this last stage, students should show that they've retained information by transferring their new knowledge or skill to situations that are different from the ones you've trained them on. Repeated practice is the best way to ensure that people retain information and use it effectively. As students become more proficient, schedule in variants of the practice runs and expose people to different situations, so that they become comfortable generalizing

**Empirical Studies**

 Waguru (2015), embarked on a descriptive survey research design on challenges facing teachers in utilizing instructional resources when teaching mathematics in public secondary schools in Nairobi county, kenya. The target population was 80 public secondary schools in the County. The population was sampled using stratified sampling techniques to include all categories of schools in the study and then proportionately sampled to give a sample size of 10 public secondary schools. The categories of schools included both girls and boys day and boarding schools as well as County/National schools. Five mathematics teachers were selected from each school yielding a total of 50 respondents. Data was collected using Mathematics Teachers‟ Questionnaire (MTQ). Classroom Observation Schedule (COS) was also used to investigate the types of instructional resources used and the frequency of their use. Two observations were done in every school in the sample. Form three classes were chosen because they are known to be well adjusted to their school systems. The validity and reliability of the instruments were enhanced by a pilot study. Data collected was analyzed using Statistical Package for Social Sciences (SPSS) and then presented in the form of frequency tables and percentages. The significant challenges facing teachers in utilizing instructional resources in teaching mathematics included; inadequate instructional resources, inadequate teacher professional development, heavy work load and large class sizes. The study further found out that most of the teachers interviewed were qualified and had been trained on the use of instructional resources in teaching but follow-up mechanisms like in-service training were inadequate.

 It has been observed that mathematics teachers rarely utilize a wide variety of instructional media as expected from their pre-service and in-service training. There was need to establish the challenges these teachers faced in utilizing instructional resources. This study sought to find; the challenges facing mathematics teachers in utilizing instructional resources in teaching the subject in Nairobi County, the status of in-service training of mathematics teachers in Nairobi County, possible solutions to the challenges facing mathematics teachers in utilizing instructional resources and suggestions for further research.

The sited work relates with this current work, it indicates that teachers rarely utilize the instructional materials in kenya, the present research work is trying to find out the extent to which male and female teachers use of audiovisual materials which are also instructional materials in Oji river local government Area in Enugu state.

According to Billman, (2014) carried out a research work on the topic technology in mathematics a case study of mathematics department at a research intensive university in South Africa. In order to meet the changing needs of today's students and society, instructors need to adapt to new teaching methods. The purpose of this study was to explore integration of technology into teaching and learning of mathematics, South Africa university. instrument for data collection were questionnaires and interviews, questionnaires were completed by staff lecturing undergraduate mathematics and both quantitative and qualitative data were collected in this survey. selected interview were conducted with respondents to obtain data, the data was analysed using simple graphical analysis for descriptive data. The study show that half of the members feel that chalkboard are more suitable than technology for teaching mathematics. This findings support the idea of strong subject culture , age did not emerge as a factor for preference of either technology or the chalkboard, although gender, academics qualification and teaching qualification did. Subject culture is strongly rooted under male members of staff, while female staff felt more positive towards the use of technology for teaching. The higher up in the ladder of academic qualification indicated a preference for technology for teaching. Use of chalkboards decreased significantly over the past ten years, while the use of modern technologies has increased accordingly. The study showed that the majority of teaching staff make limited use of learning management system LMS, the use of technologies as a learning tools for students was found to be limited amongst staff.

Teaching staff at this department do integrate technology into their teaching, and therefore practice blended teaching, however, many of the benefits offered by technology are underutilized and the use of technology does not necessarily lead to improved learning.

It was observed that the research work was carried out on the topic, technology in mathematics a case study of mathematics department at a research intensive university in South Africa, but the current study is focused on the extent of the use of audiovisual materials in oji river local government Area .

Adedayo, (2014) Availability of basic teaching/learning materials in selected secondary schools in Lagos state. Descriptive survey research design was adopted, and the population for the study comprises all senior secondary school students in Lagos State. Simple random sampling technique was the sampling method used to select three secondary schools in each educational district from the six educational districts in Lagos State. 18 senior secondary schools were used for the study. The researcher selected 40 students from each school drawn from science, art and commercial class. A total number of 720 students were used for the study. For the purpose of data collection three research instruments were used by the researcher,

the instruments were titled: ‘’ questionnaire on Effect of Instructional Materials on Mathematics Achievement, questionnaire on Effect of Teaching Methodology on Mathematics Achievement and Standardized Achievement Test in Mathematics. These instruments were self-developed questionnaires. A reliability test was conducted on the instruments using test-retest method, a reliability coefficient of 0.76 and 0.82 were obtained. In order to determine the effect of instructional

Materials and teaching methodology on mathematics achievement among senior secondary school students in Lagos State three research questions and three hypotheses were formulated to guide the study. The hypotheses were tested at 0.05 level of significant using Pearson Product Moment Correlation statistics. The results revealed that teaching methodology has significant effect on mathematics achievement among senior secondary school students in Lagos State. Instructional

materials has significant effect on mathematics achievement among senior secondary school students in Lagos State. It was recommended that teacher should learn how to use diverse methodology in their teaching rather than restrict themselves to a particular method.

Therefore, the researcher noticed a gap that if the use of instructional materials enhances student performance then when used on a high extent, will make learning permanent.

Taiwo (2009) carried out this study an evaluation on teachers’ perception of the role of media in classroom teaching in secondary schools in Oyo State of Nigeria. The population of the study was 33 Local Government Area in Ogun state. For this study, the local government areas were divided into five major zones – Ibadan, Ibarapa Oyo, Ogbomoso and Oke-Ogun zones. The stratified proportional random sampling procedure was used to select 10 LGA, from the 33 LGA, The simple random sampling procedure was then used to select 2 secondary schools in each of the 10 selected LGA and 10 teachers from each secondary school. A total of 200 teachers participated in the study. However, out of these 200 teachers, only 150 completed 110 trained and 40 untrained teachers at two gender level (70 females and 80 males). the instrument for data collection was questionnaire and interview. Two media roles were selected for the study, media used to supplement the teacher by enhancing his effectiveness in the classroom and media used to substitute the teacher through instructional media system. The first hypothesis was tested by applying chi-square test of one variable case. While the last two hypotheses

were tested via chi-square of independence of categorical variables. The findings revealed that there were significant differences in the perceptions of teachers about each of the two roles of media identified for the study. In addition there was significant difference found between Jthe perceptions of trained and untrained teachers. However, the teachers’ gender was not significant.

The research reveals that there is a significant difference in the perception of teachers in the roles of media which affects the usage of those media in teaching and learning of mathematics.

According to Edeh (2016) when he embarked on the descriptive research on the causes of inadequate use of instructional materials in teaching and learning of mathematics. Method of data collection was questionnaire, the population of the study was primary and secondary schools in seventeen (17) local government area of Enugu state from which six schools were randomly selected, mean and simple percentage were used for data collection. The found out that incompetency of teachers, poor funding, non challant attitude of teachers, non challant attitude of students, and uncared administrative attitude of some schools and supervisors are the cause of inadequate use of instructional materials in teaching and learning of mathematics. Nwaegbu (2001) was of the opinion that incompetency in teachers contributed a lot to the inadequate use of instructional materials in teaching and learning of mathematics for the fact that some teachers lacked the knowledge and skills of using most of the necessary materials required to teach. Nwaegbu futher stressed that most teachers are not properly trained or are not even trained at all, they are not exposed to the knowledge or idea of these materials. The researcher recommended that the government should train teachers and expose them to the importance of using instructional materials.

The gap revealed that, teachers neglect towards the use of audiovisual materials in teaching and learning of mathematics is as a result of non challant attitude among teachers.

**Summary of Review of Related Literature**

This research work was proposed to find out the extent of the use of audio visual materials in teaching and learning of mathematics.

The researcher discussed the literature review under the conceptual framework, theoretical framework, and empirical studies.

The conceptual discussed the concept of audiovisual material, Concept of teaching and learning of Mathematics, Attitude of teachers towards the extent of the use of audiovisual materials. Under theoretical studies Dale’s Cone of Experience and Robert Gagne's Nine Levels of Learning model was reviewed.

In the cause of the study the following work was reviewed Waguru,(2015) who researched on challenges facing teachers in utilizing instructional resources when teaching mathematics, Billman, who (2014) researched on technology in mathematics, Adedayo, (2014) Availability of basic teaching/learning materials in selected secondary schools in Lagos state, Taiwo, (2009) who researched on evaluation on teachers perception of the role of media in classroom teaching in secondary schools, Edeh, (2016) who researched on causes of inadequate use of instructional materials in teaching and learning of mathematics.

**CHAPTER THREE**

**RESEARCH METHODS**

This chapter covers the Design of the study, Area of the study, population of the study, sample and sampling technique, instrument for data collection, validation of the instrument, reliability of the instrument, method of data collection and method of data analysis.

**Design of the Study**

The design of the study was descriptive survey research design. Descriptive survey research is a study designed to depict the participant in an accurate way. It encompasses any measurement procedure that involves asking question from a respondent. It was designed to find out the extent of the use of audiovisual materials in teaching and learning of mathematics.

**Area of the study**

The study was conducted in secondary schools in Oji river local government area of Enugu state. Oji river local government Area is in Awgu educational zone of Enugu state. The reason for the choice of the area was because of the failure of mathematics in that area, Maree,(2006) reveal that the failure rate in mathematics in schools is unacceptably high.

**Population of the study**

The population of the study consisted of four public secondary schools out of eleven public secondary schools and 15 teachers in Oji River Local Government Area in Enugu state. The total population was 1668 students and 15 teachers.

**Sample and Sampling techniques**

The sample for the study was 215, the sample was drawn using simple random sampling technique, four (4) schools were randomly selected for the study. Fifty (50) students from each schools were selected and 15 teachers.

**Instrument for data collection**

 The instrument for data collection was questionnaire and observation, questionnaires are used to reach a large number of subjects who are able to read and write independently. The questionnaire enabled the researcher to solicit information on the availability of audiovisual materials, the extent of the use of audiovisual materials and the extent to which male and female teacher effectively use audiovisual materials in teaching and learning of mathematics.The use of classroom observation as an instrument was to allow for more objectivity in the study. It was used as a back-up for the responses given by teachers and students in the questionnaires

**Validity of the Instrument**

Validation of the instrument was done through face validity. Validation was made by 2 experts in measurement and evaluation and mathematics from Godfrey Okoye University in Enugu State.

**Reliability of the Instrument**

The reliability of the instrument was tested using Cronbach's Alpha with the result 0.9 which shows that the instrument was reliable. The researcher made use of Cronbach's Alpha test , to check if the questionnaire items were reliable.

**Method of data collection**

The researcher collected the data through distribution of the questionnaire by self and collecting them back immediately doing a checklist. This was done to ensure that all the questionnaires distributed were collected.

**Method of data analysis**

The research questions were answered using mean and standard deviation respectively and the hypothesis were tested using t- test calculation.

Decision rule: it is a four point likert scale

Very high extent (VHE): 4.00 - 3.50

High extent (HE): 3.40 - 2.50

Low extent (LE): 2.40 -1.50

Very low extent (VLE): 1.49 - 0

If the result is above the acceptable mean 2.50 it is accepted and if it is below the acceptable mean it is rejected.

**CHAPTER FOUR**

**RESULTS**

**Research Question one**

To what extent are mathematics audiovisual materials available in teaching and learning.

**Table one**

 **Mean score of students for each item in research question one**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **ITEMS** | **VHE****4** | **HE****3** | **LE****2** | **VLE****1** | **TOTAL** |  **X** | **DECISION** |
| 1 | Computers are available in the school  | 50200 | 2060 | 2958 | 101101 | 200 | 2.09 | Reject |
| 2 | Interactive whiteboard are available in the classroom | 30120 | 1957 | 2550 | 126126 | 200 | 1.77 | Reject |
| 3 | Projectors are available in the school | 27108 | 2575 | 1938 | 129129 | 200 | 1.75 | Reject |
| 4 | Internet access is available in the school for fun mathematics | 2392 | 2060 | 3060 | 127127 | 200 | 1.69 | Reject |
| 5 | Mathematics charts and pictures are available in the classroom | 36144 | 2369 | 2346 | 118118 | 200 | 1.89 | Reject |
| 6 | Illustrated mathematics books are available in the school | 47188 | 36108 | 1836 | 9999 | 200 | 2.16 | Reject |
| 7 | Computer games and software's are available in the school | 2496 | 1957 | 2244 | 135135 | 200 | 1.66 | Reject |
| 8 | Mathematical games are available in the school | 46184 | 2163 | 2346 | 110110 | 200 | 2.02 | Reject |
| 9 | Video tapes are available in the classroom | 832 | 412 | 2244 | 166166 | 200 | 1.27 | Reject |
| 10 | Flash cards are available in the school | 936 | 1442 | 2040 | 157157 | 200 | 1.38 | Reject |

The researcher used questionnaire items which state that computer are available in the school and observed that the mean score is 2.09 which is a low extent. Interactive whiteboard are available in the classroom and the mean score is 1.77 which is a low extent. Projectors are available in the classroom and observed that he mean score is 1.75 and is a low extent, internet access are available in the school for fun mathematics and observed that the mean score is 1.69, and is a low extent, mathematics chats and pictures are available in the classroom 1.89, and is observed and is a low extent, illustrated mathematics books are available in the school and observes that the mean score is 2.16 which is a low extent, Mathematical games are available in the school and observed that the mean score is 1.66 which is a low extent, computer games and software’s are available in the school and observed that the mean score is 2.02 which is a low extent, video tapes are available in the school and observed that the mean score is 1.27 which is a low extent, flash cards are available in the school and observes that the mean score is 1.38 which are all below the acceptable mean of 2.50. Based on the question asked, the researcher observed that there are low mathematics audiovisual materials available in teaching and learning.

**Research Question Two**

 To what extent are audiovisual materials used in teaching and learning of Mathematics.

**Table two**

 **Mean score of students for each item in research question two**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S/N | ITEMS | VHE4 | HE3 | LE2 | VLE1 | TOTAL |  x | DECISION |
| 1 | Charts and pictures are effectively used in teaching and learning of Mathematics | 41164 | 29117 | 2244 | 108108 | 200 | 2.17 | Reject |
| 2 | Computers are used in mathematics classes for teaching and learning | 1664 | 1133 | 2346 | 150150 | 200 | 1.47 | Reject |
| 3 | In mathematics classes, interactive whiteboard is used in teaching and learning | 34136 | 2575 | 1530 | 126126 | 200 | 1.84 | Reject |
| 4 | Fun mathematics is used in teaching and learning of mathematics effectively | 2184 | 3090 | 2550 | 124124 | 200 | 1.74 | Reject |
| 5 | In mathematics classes, projectors are used for teaching and learning in the school  | 26104 | 1957 | 2958 | 125125 | 200 | 1.72 | Reject |
| 6 | Illustrated mathematics books are used in teaching and learning in the school | 44176 | 33 99 | 3060 | 9393 | 200 | 2.14 | Reject |
| 7 | Mathematical games are used in teaching and learning of mathematics | 2184 | 2678 | 1938 | 134134 | 200 | 1.67 | Reject |
| 8 | Students make use of internet access for fun mathematics in teaching and learning | 1872 | 1854 | 1530 | 149149 | 200 | 1.53 | Reject |
| 9 | Video tapes are used in teaching and learning of mathematics | 1664 | 412 | 2448 | 158158 | 200 | 1.4 | Reject |
| 10 | Flash cards are used in teaching and learning of mathematics | 1248 | 1236 | 2550 | 151151 | 200 | 1.43 | Reject |

From the table the items are Computers are used in mathematics classes for teaching and learning and observed that the mean score is 2.17 which is a low extent, In mathematics classes, interactive whiteboard is used in teaching and learning and observed that the mean score is 1.47 which is a very low extent, Charts and pictures are effectively used in teaching and learning of Mathematics and observed that the is 1.84, which is a low extent, Fun mathematics is used in teaching and learning of mathematics effectively and observed that the mean score is 1.74 which is a low extent, In mathematics classes, projectors are used for teaching and learning in the school and observed that the mean score is 1.72 which is a low extent, Illustrated mathematics books are used in teaching and learning in the school and observe that the mean score is 2.14 which is a low extent, Mathematical games are used in teaching and learning of mathematics and observed that the mean is1.67 which is a low extent, Students make use of internet access for fun mathematics in teaching and learning and observed that the mean score is 1.53 which is a low extent, Video tapes are used in teaching and learning of mathematics and observed the mean score is 1.4 which is a very low extent, Flash cards are used in teaching and learning of mathematics and observed that the mean score is 1.43 which is a very low extent. This is below the acceptable mean of 2.50. Based on the question asked the researcher observed that the extent to which audiovisual materials are used in teaching and learning of Mathematics is on a low extent.

**Research Question Three**

To what extent do male and female teachers effectively use audiovisual materials in teaching and learning of mathematics

**Table three**

 **Mean score and standard deviation of male and female teachers in research question three**

|  |  |  |  |
| --- | --- | --- | --- |
| Gender | Mean | Standard deviation | Number |
| Female | 24.81 | 8.339664262 | 10 |
| Male | 18.2 | 13.43874994 | 5 |

The researcher used questionnaire items and observed that female teachers have the highest mean score of 24.81 with standard deviation of 8.33966 while the male teachers have the mean score of 1.82 with standard deviation of 13.43874. This means that female teachers effectively use audiovisual materials in teaching and learning of mathematics more than the male teachers.

**Research Hypothesis**

There is no significant difference on the extent male and female teachers effectively use audio visual materials in teaching and learning of mathematics.

**Table four**

**T- test table of difference in mean of male and female teachers for questionnaire**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Gender | Mean | S.D | T cal | T tab | L/S | DF | Decision |
| Female | 24.81 | 8.339664262 | 3.522284173 | 2.160 | 0.05 | 13 | Reject  |
| Male | 18.2 | 13.43874994 |

Since the mean score of female teachers is 24.81which is greater than the mean score of the male teachers which is 18.2, the researcher reject the null hypothesis and claim that there is a significant difference on the extent male and female teachers effectively use audio visual materials in teaching and learning of mathematics.

**Table five**

**T- test table of difference in mean of male and female teachers for observation.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Gender | Mean | S.D | T cal | T tab | L/S | DF | Decision |
| Female | 22.61 | 5.339464262 | 3.222841732 | 2.160 | 0.05 | 13 | Reject  |
| Male | 15.2 | 11.43434994 |

Since the mean score of female teachers is 22.61which is greater than the mean score of the male teachers which is 15.2, the researcher reject the null hypothesis and claim that there is a significant difference on the extent male and female teachers effectively use audio visual materials in teaching and learning of mathematics.

**CHAPTER FIVE**

**DISCUSSION, IMPLICATION, RECOMMENDATION, CONCLUSION AND SUMMARY OF THE STUDY**

This chapter deals with discussion of the result, conclusion, implication, recommendation and summary.

**Discussion of the results**

**Availability of Audiovisual materials in teaching and learning of mathematics**

From the findings of the study, the researcher discovered that audiovisual materials are available in a low extent in most schools in Oji river local government area, as a result of that, mathematics concepts are seen as an abstract concept, and a difficult subject for students to understand which affects the performance of students in mathematics. This is in line with Adedayo, (2014) who researched on availability of basic teaching and learning materials in selected secondary schools in Lagos state and found out that Instructional materials has significant effect on mathematics achievement among senior secondary school students in Lagos State, and also Gopal (2010) who opined that audiovisual materials facilitate the acquisition, the retention and the recall of lessons learned, because, they seem to evoke the maximum response of the whole organism to the situations in which learning is done and lack of those materials make students loose interest in the concept.

**The extent of the use of Audiovisual materials in teaching and learning of mathematics**

From the analysis of the result, it was observed that the use of audiovisual materials in teaching and learning of mathematics is low, despite the importance attached to the use of audiovisual materials in teaching and learning of mathematics according to Oketunji (2000) stressed that audiovisual materials when effectively used have these advantages: they lessen major weakness of verbalism, humanize and vitalize subject matter, provide interesting approach to new topics and give initial correct impressions, economic time in learning, supply concrete materials needed, stimulate the initiative of the students, extending experience. The low extent of the use of audiovisual materials in mathematics classes which result to the failure of students in mathematics according to West Africa Examination Council (WAEC), Adenipekun (2017) said that only 26.01 percent , obtained credit in Mathematics, while the remaining candidates failed.

**Mathematics female teachers use audiovisual materials better than male teachers**

It was observed by the researcher, that mathematics female teachers use audiovisual materials in teaching and learning of mathematics more than the male teachers, it is shown that there is a significant difference on the extent male and female teachers effectively use audiovisual materials in teaching and learning of mathematics. According to Billman (2004), Subject culture is strongly rooted under male members of staff, while female staff felt more positive towards the use of technology for teaching.

**Conclusion**

The purpose of the study is to find out the extent of the use of audiovisual materials in teaching and learning of mathematics in Oji River Local Government Area, Enugu State.

 Findings from the analysis showed that audiovisual materials in teaching and learning of mathematics are not available in some schools in oji river local government area in Enugu state, it is also observed that the extent to which audiovisual materials are used in teaching and learning of Mathematics is low in schools, it also reveals that female teachers effectively use audiovisual materials in teaching and learning of mathematics more than the male teachers in Oji river local government Area in Enugu state.

**Implications of the findings**

The results of this study have obvious implications for the teaching and learning of mathematics.

Since audiovisual materials are not available in schools, it implies that schools should be provided with audiovisual materials, for effective teaching and learning of mathematics, this is because teachers can only use what is available.

Also since the use of audiovisual materials in teaching and learning of Mathematics is at a low extent, there is need for mathematics teachers to make use of these materials, this is because it reduces the abstract nature of mathematics and help improve students performance.

There is also a need for male teachers to effectively use audiovisual materials in teaching and learning of mathematics as the study reveals that female teachers effectively use audiovisual materials in teaching and learning of mathematics more than the male teachers.

**Recommendations**

The following recommendations are made in line with the result of the study:

1. Government / Ministry of Education should provide audiovisual materials for all the public schools in Oji River Local Government Area in Enugu State.

2. Government should provide fund for schools to enable them purchase audiovisual materials that are needed.

3. Teachers should make proper use of audiovisual materials in teaching and learning of mathematics.

**Limitations of the study**

As a result of plethora of audiovisual materials used in teaching and learning of mathematics, the researcher had to narrow down the audiovisual materials to the ten, that are used in the research work

**Suggestions for further studies**

Researchers should carry out the research in other geographical Area

 **Summary**

The purpose of the study is the extent of the use of audiovisual materials in teaching and learning of Mathematics in Oji River Local Government Area, Enugu State. The population of the study consisted of 1668 students of four public secondary schools and fifteen mathematics teachers. The sample was drawn using simple random sampling technique, out of 11 public secondary schools in Oji river local government Area, 4 schools were randomly selected for the study. Fifty (50) students from each school were selected and 15 teachers making it a total of 215 as the sample size. Three research questions were formulated, the reliability of the instrument was tested using Cronbach's Alpha with the result 0.9 which shows that the instrument was reliable. Validation of the instrument was done through face validity. Validation was made by 2 experts in measurement and evaluation and mathematics from Godfrey Okoye University in Enugu State. The questionnaires were administered to the students and mathematics teachers and were collected by the researcher. The data were analysed using mean for research question and t test calculation for the hypothesis. Findings from the analysis showed that audiovisual materials in teaching and learning of mathematics are not available in some schools in Oji river local government area in Enugu state, it is also observed that the extent to which audiovisual materials are used in teaching and learning of Mathematics is low in schools, it also reveals that female teachers effectively use audiovisual materials in teaching and learning of mathematics more than the male teachers in Oji river local government Area in Enugu state. Some solutions includes that Government / Ministry of Education should provide audiovisual materials for all the public schools in Oji River Local Government Area in Enugu State, Government should provide fund for schools to enable them purchase audiovisual materials that are needed. Teachers should make proper use of use of audiovisual materials in teaching and learning of mathematics.

References

Adedayo, O. A. (2014).*Availability of basic teaching and learning materials in selected secondary schools in Lagos state. Enriching science, technology and Mathematics education .*Proceedings of the 41st Annual STAN Conference

Adenipekun (2017), *failure in mathematics* retieved from vanguard media limited, nigeria, 20June 2018

Ambrose, S. O. (2003), *Fundamentals in Education. In: Osisa, W.(ed) Education for Nigeria certificate in Evaluation.* Lagos:“Revisiting General Theory in Historical Sociology’’, Social Forces 83: 3, 459-490.

Anzaku F (2011). Library Experts Speaks on Audio-Visual Material. *A paper presented at the United Nations Educational, Scientific and Cultured Organization (UNESCO) World Day for Audio-Visual Heritage.* Lafia.

Anih (2001) , *the place of instructional materials in curriculum development,* education and development

Ballon and Foster E(2003).The use of A/V aids in the teaching of Arithmetic the rambler press. *New York The Turkish Online Journal of Educational Technology – TOJET* January ISSN: 1303-6521 volume 8 Issue 1 Article 8

 Benard, J.,(2009) *The multimedia library: materials, selection and use*. Academic Press Inc. San Diego.

Billman, A, (2014): *technology in mathematics a case study of mathematics department at a research intensive university* in South Africa

 Crawford, R.,(2013) *Visual information systems: the power of graphics and video. Educational and Training Technology International*, 1993, *30*(4).20-26.

Dike , V.W (2003). *Library Resources in Education ,* Enugu: ABIC Publisher.

Dale, E(1960). *Audio-Visual Methods in Teaching,* 3rd ed., Holt, Rinehart & Winston, New York, 1969, p.108

 Edeh (2016), : *the causes of inadequate use of instructional materials in teaching and learning of mathematics. Education,* Ondo, Adeyemi College of Education Textbook Development Board.

Elain, J. F. (2013),*Variable definitions, data and programs for* *teachers, students and academic achievement,* *econometrical supplementary materials 73,2,* www.econometric society.org/ecta/supmat/4139data.pdf.

Eze, E.U. (2003). *Effect of Instructional Materials on the Academic Performance of Junior Secondary School Students in Social Studies.* Unpublished PGDE Thesis. Imo State University-Nigeria

Eke (2003) *The impact of availability of Educational Resources on pupils’ Cognitive Achievement in Public Primary schools* *Unpublished Med Report, University of Nigeria*

 Feza, (2012): *The How and Why Wonder Book of Mathematics*, Grosset & Dunlop, New York, 1961.

Farrant, J.S. (2004). *Principles and practice of Education;**England; Longman Group UK Ltd.*

Gagne, R. (1985), *The condition of Learning (4th).* New York, Rinehart & Winston.garden New Delhi.

Glazer(2001): *Introduction to Mathematical Thinking,* published by Keith Devlin,Palo Alto CA,

Gopal, B. (2010). Digital Games in Education: *The Design of Games-Based Learning Environments. Journal of Research on Technology in Education,* v40(1), p23-38.

Gridina, T.L(2000), Teaching with Multimedia: *Do Bells and Wishtles Help Students Learn . Journal of Technology and Human Services* 24(2/3): 167-79

Hüvelmeyer,( 2014) *Global Journal of human-social science Linguistics & Education Volume 14 Issue 1 Version 1.0 Year 2014Type: Double Blind Peer Reviewed* International Research Journal Publisher: Global Journals Inc. (USA) Online ISSN: 2249- 460x & Print ISSN: 0975-587X

Ilogu, G. C. (2005), *Educational Research and International Federation of Library Associations and Institutions IFLA,* . Guidelines for Audio-Visual and Multimedia Materials in Libraries and other Institutions archive.

Jain,P..(2004); *Educational Technology,* Delhi Moujpur publication.

James, M. (2001), “*Revisiting General Theory in Historical Sociology’*’, Social Forces 83: 3, 459-490.

 Jeward, F.J.(2013),( *Mathematics and Mathematics History*. J*.* Weston Walch. Portland, 1997.

Katherine, M. (2009). *Digital game-based learning. New York:* *McGraw-Hill*. *Video Game Research in cognitive and educational sciences*. Cognition, Brain, Behaviour, v11(1), p131-142.

(Kerry, 2000). Learning mathematics on the Internet. *Proceedings of the 13th Asian Technology Conference on Mathematics*. (pp 233-242) ATCM Inc.; Bangkok, Thailand.

Kishor,N.(2003); *Educational technology*, *Multidisciplinary Journal of Research Development, 1( 3),* 74-85. Abhishek publication.

Kunari ,C (2006); *Methods of teaching educational Technology*, *students learning outcomes in mathematics. An unpublished Ph.D Thesis, University of Ibadan.*

.

 Lestage. A (2012). The use of Audiovisual Aids in Education: Extracted from UNESCO Chronicles, *Regional Seminar on the use of Audio-Visual Aids in Adult and School Education i*n Latin America

Mohanty, J (2001); *Educational Technology,* Publish by Rajouri Bearing fruit: the longer-term effects of management training using interactive video

 Mcnaught, A (2007), *Moving Images and Sound : Inclusive and Accessible. Moving Images Knowledge and access:* The BUFVC Handbook edited by C. Grant and I. Mekere London: British Universities Film and Video Council pp. 29-33.

Merriam Webster dictionary of the English language (2018)

Maree,(2006) *The mathematical territory between direct modelling and proficiency*. What Works? Research into Practice. Student Achievement Division.

 Moseley, A.,(2002) Relationships between research and the NCTM standards. *Journal for Research in Mathematics Education, 30*(1), 3–19.

Natoli A Y. (2011). *Report on the educational use of games.* Retrieved 9 April 2018, from http://www.teem.org.uk/publications/teem\_gamesined\_full.pdf

Ngozi, B.O, (2012) , *Motivating use of Audio-Visual in a Nigeria Technological University Library*. Journal of Education and Social Research Vol. 2(1) Jan.

Nwaegbu T. O. (2005), *Predicting Students’ Performance in Senior Secondary Certificate Examinations* from Performance in Junior Secondary Certificate Examinations in Ondo State.

 Obodo S.A (2006). *General Teaching Methods:* School of Education National Open University, Nigeria.

Odousoro, U. I. (2000), *The relative effect of computer and text assisted programmed instruction on**Essentials of Educational and Social Science*, Research methods. Nairobi: Mazola Publisher.

Onwu , J. A. (2001)*. Need for improvisation in classroom teaching*. The Punch, June 20

 Oketunji I (2000), *Application for Information Technologies in Nigerian Libraries: Problems and Prospects in I.K : Nwalo (ed); Information Technology in Library and Information Technology Education in Nigeria.* National Association of Library and Information Sceience Education NALISE

Papert T.A (2000). *The Effect of Instructional Materials on Learning of History in Selected Primary Schools in Ogbomosho Local Government Area:* Unpublished B.ED Thesis.

 Poter N.C. (2003) Using Information Communication Technology (ICT) in Secondary Schools: *Prospects and Challenges for 21st Century. Multidisciplinary Journal of Research Development.* National Association for Research Development (NARD) 10(1) 178-182 July.

Rather,A.R.(2004)*;Essentials Instructional Technology*, published by Darya gaj New Delhi.

 Rukangu(2013): *Love & Math. The Heart of Hidden Reality, Basic Books/PerseusBooks,* Philadelphia PA, Timothy Gowers, Imre Leader, and June Barrow-Green, eds.:

Setidisho, N.O.H. (2000), Aims of teaching mathematics, *West African Journal of Education,*

Singh, Y.k(2005);*Instructional Technology in Education*, published by Darya ganj new Delhi

Somkel I (2003), *Audiovisuel pedagogie et communication*. Editions d´organization. Paris, 1980.

Sperling(2002): A glimpse of heaven, in: *History of Mathematical Programming | A Collection of Personal Reminiscences,*" CWI and North-Holland, Amsterdam, 1991, pp. 32(54).

Swank, R.C (2011), *The Educational Function of University Library*. http://www.ideals.illinois.edu/bitestream/handle/2142/5455/librarytrend

Soyemi (2005), High expectations: A "how" of achieving equitable mathematics classrooms. *Negro Educational Review*, *56*(2/3), 127.

Taiwo, S (2009) *teachers’ perception of the role of media in classroom teaching in secondary schools to Mathematics*, Princeton University Press, Princeton NJ, The Turkish Online Journal of Educational Technology – TOJET January 2009 ISSN: 1303-6521 volume 8 Issue 1 Article 8.

Turkma, B. M. (2000). Changing how and what children learn in school with computer-based technologies. *The Future of Children,* v10(2), p76-101.

Waguru, JA(2015) *Challenges facing teachers in utilizing instructional resources when teaching mathematics* in public secondary schools in nairobi county

Webster’s Encyclopedia Unabridged Dictionary of the English Language(2008),

 Yang, T.,(2002) *Creative thinking and problem solving in gifted education*. Dubuque, IA: Kendall/Hunt Publishing Company.

**Appendix A**

**QUESTIONNAIRE**

Name of school.............................................................................................

sex: Male female

INSTRUCTION

 kindly tick your preferred option

VHE =Very high extent , HE =High extent, LE =Low extent, VLE= Very low extent.

Extent of availability of audiovisual materials for teaching and learning Mathematics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S/N | ITEMS | VHE | HE | LE | VLE |
| 1 | Computers are available in the school  |  |  |  |  |
| 2 | Interactive whiteboard are available in the classroom |  |  |  |  |
| 3 | Projectors are available in the school |  |  |  |  |
| 4 | Internet access is available in the school for fun mathematics |  |  |  |  |
| 5 | Mathematics charts and pictures are available in the classroom |  |  |  |  |
| 6 | Illustrated mathematics books are available in the school |  |  |  |  |
| 7 | Computer games and software's are available in the school |  |  |  |  |
| 8 | Games are available in the school |  |  |  |  |
| 9 | Video tapes are available in the classroom |  |  |  |  |
| 10 | Flash cards are available in the school |  |  |  |  |

Extent of the use of audiovisual materials in teaching and learning of Mathematics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S/N | ITEMS | VHE | HE | LE | VLE |
| 1 | Charts and are effectively used in teaching and learning of Mathematics |  |  |  |  |
| 2 | Computers are used in mathematics classes for teaching and learning |  |  |  |  |
| 3 | In mathematics classes, interactive whiteboard is used in teaching and learning |  |  |  |  |
| 4 | Fun mathematics is used in teaching and learning of mathematics effectively |  |  |  |  |
| 5 | In mathematics classes, projectors are used for teaching and learning in the school  |  |  |  |  |
| 6 | Illustrated mathematics books are used in teaching and learning in the school |  |  |  |  |
| 7 | Mathematics games are used in teaching and learning of mathematics |  |  |  |  |
| 8 | Students make use of internet access for fun mathematics in teaching and learning |  |  |  |  |
| 9 | Video tapes are used in teaching and learning of mathematics |  |  |  |  |
| 10 | Flash cards are used in teaching and learning of mathematics |  |  |  |  |

**Appendix B**

**OBSERVATION TABLE**

Extent of the use of audiovisual materials in teaching and learning of Mathematics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S/N | ITEMS | VHE | HE | LE | VLE |
| 1 | Charts and are effectively used in teaching and learning of Mathematics |  |  |  |  |
| 2 | Computers are used in mathematics classes for teaching and learning |  |  |  |  |
| 3 | In mathematics classes, interactive whiteboard is used in teaching and learning |  |  |  |  |
| 4 | Fun mathematics is used in teaching and learning of mathematics effectively |  |  |  |  |
| 5 | In mathematics classes, projectors are used for teaching and learning in the school  |  |  |  |  |
| 6 | Illustrated mathematics books are used in teaching and learning in the school |  |  |  |  |
| 7 | Mathematics games are used in teaching and learning of mathematics |  |  |  |  |
| 8 | Students make use of internet access for fun mathematics in teaching and learning |  |  |  |  |
| 9 | Video tapes are used in teaching and learning of mathematics |  |  |  |  |
| 10 | Flash cards are used in teaching and learning of mathematics |  |  |  |  |

**Appendix c**

Godfrey Okoye University,

Thinkers corner,

Emene, Enugu,

Enugu state.

27 June, 2018.

Sir,

**PERMISSION TO CARRY OUT RESEARCH IN YOUR SCHOOL**.

 I Nnadika Nnetachukwu Peace, a Mathematics Education student at Godfrey Okoye University. I am required to submit as part of my assessment, a research work report on “The extent of the use of Audiovisual materials in the teaching and learning of mathematics in secondary schools in Oji River Local Government Area, Enugu State”

 To achieve this, I have selected your school to participate in this study.

The information gathered will be used purely for academic purposes. The findings of the study will be of benefit to all mathematics teachers and students and will be available for reference at the university.

Your assistance and cooperation will be highly appreciated.

Thank you in advance.

Yours faithfully,

Nnadika Nnetachukwu Peace.

**Appendix D**

**Hypothesis**

There is no significance difference on the extent male and female teachers effectively use audio visual materials in teaching and learning of mathematics.

**Table one showing response of female teachers**

|  |  |  |  |
| --- | --- | --- | --- |
| S/N | SCORES |  X-X | X-X2 |
| 1 | 29  | 29 - 24.81 | 17.556 |
| 2 | 15 | 15 - 24.81 | 96.236 |
| 3 | 16 | 16 - 24.81 | 77.616 |
| 4 | 15 | 15 - 24.81 | 96.236 |
| 5 | 14 | 14 - 24.81 | 116.85 |
| 6 | 33 | 33 - 24.81 | 67.076 |
| 7 | 18 | 18 - 24.81 | 46.376 |
| 8 | 23 | 23 - 24.81 | 3.276 |
| 9 | 28 | 28 - 24.81 | 10. 176 |
| 10 | 12 | 12 - 24.81 | 164.096 |
| Total |  |  | 695.5 |

Formula for standard deviation

∑( X-X2)

N

695.5

10

Standard deviation = 8.339664262

**Table two showing male teachers response**

|  |  |  |  |
| --- | --- | --- | --- |
| S/N | SCORES | (X-X) | X-X2 |
| 1 | 11 | 11 -18.2 | 51.84 |
| 2 | 8 | 8 -18.2 | 104.04 |
| 3 | 11 | 11 -18.2 | 51.84 |
| 4 | 8 | 8 -18.2 | 104.04 |
| 5 | 5 | 5 -18.2 | 174.24 |
| 6 | 15 | 15 -18.2 | 10.24 |
| 7 | 11 | 11 -18.2 | 51.84 |
| 8 | 7 | 7 -18.2 | 125.44 |
| 9 | 7 | 7 -18.2 | 125.44 |
| 10 | 8 | 8-18.2 | 104.04 |
| Total |  |  | 903 |

Formula for standard deviation

∑( X-X2)

 N

903

5

Standard deviation = 13.43874994

X1-X2
 SDI+SD2
NI N2

 6.61

8.33966+13.43874
10 5

6.61

1.8766

Tcal = 3.5228

 Degree of freedom

N1 + N2 - 2

10 + 5 -2 = 13

**Appendix E**

Cronbach Alpha reliability test

N= The number of items

C= Average covariance between items pairs

V= Average variance

N . C

V +(N-1). C

20 (0.9O)

0.10+ (20 -1) 0.90

18

17.2

=0.9