IMPACTS OF USING ETHNOMATHEMATICS IN TEACHING ON PERFORMANCE AND RETENTION IN MATHEMATICS AMONG PRIMARY III PUPILS,LERE EDUCATION DISTRICT, KADUNA, NIGERIA

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DECLARATION

I, Shehu YA'U with registration number P15EDSC8055 declare that this dissertation titled ''Impacts of Ethnomathematics Teaching Approach on Performance and Retention in Mathematics Among Primary III Pupils in Lere Education District, Kaduna, Nigeria'' is the outcome of my research work and has been written by me in the Department of Science Education under the supervision of Prof. Y.K Kajura and Prof. C. Bolaji. The information derived from the literature and all sources of information were fully acknowledged in the text and a list of references provided. No part of this dissertation was previously presented for another degree or diploma at this or any other institution.

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CERTIFICATION

This dissertation titled ‘‘Impacts of Ethnomathematics Teaching Approach On Performance And Retention in Mathematics Among Primary III Pupils, Lere Education District, Kaduna, Nigeria’’ by Shehu YA’U with registration number P15EDSC8055 meets the regulations governing the award of the degree of Masters of Education in Mathematics of Ahmadu Bello University, Zaria and is approved for its contributions to knowledge and literary presentation.

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DEDICATION

This research is dedicated to my beloved families and friends for their unlimited support and encouragements given to me throughout my life. I am therefore highly indebted to them and praying that almighty Allah to give me the strength and opportunity to pay them back in good course.

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OPERATIONAL DEFINITION OF TERMS

Ethnomathematics: The mathematical practices of identifiable cultural groups (D'Ambrosio, 2001).

Ethnomathematics Teaching Approach: An approach or technique of teaching and learning mathematics which builds on the students' previous knowledge, background, the role his environment plays in terms of content, methods and his past and present experience of his immediate environment (D'Ambrosio, 2001)

Cultural Artifacts: The relevant local teaching materials that can be found within the students' environment for effective teaching and learning(Patrick , 2016).

Geometry: A branch of mathematics that deals with the measurement, properties , and relationships of points ,lines ,angles ,surfaces , and solids(Patrick ,2016).

Measurement: The assigning of a number to a characteristics of an object or event ,which can be compared with other objects or events.

LIST OF ABBREVIATIONS AND SYMBOLS

ETA: Ethnomathematics Teaching Approach.

WAEC: West African Examination Council

ISGEM: International Study Group on Ethnomathematics

CRE: Culturally Relevant Education

ELL: English Language Learners

MPT_1: Mathematics Performance Test 1

MPT_2: Mathematics Performance Test 2

MRT: Mathematics Retention Test

MAN: Mathematics Association of Nigeria

STAN: Science Teachers Association of Nigeria

NERDC: Nigerian Research and Development Council

CG: Control Group

EG: Experimental Group

$: And

ETC: And so on

ABSTRACT

This study investigated the impacts of using ethnomathematics in teaching on performance and retention in mathematics among primary III pupils in Lere education district, Kaduna State, Nigeria. The study was conducted based on four specific objectives. Four research questions were constructed and four null hypotheses were formulated to guide the study. A pre-test, post-test and post-posttest quasi experimental design was adopted. From a target population of two hundreds and ninety five 295 public primary Schools with 11,289 pupils (5,862 males and 5,427 females) simple random sampling techniques were used to select the schools and the class of the pupils respectively. 207 pupils were selected for the study in accordance with Central Limit Theorem that regarded a minimum of 30 sample size appropriate for experimental research. Mathematics Performance Test 1 (MPT_1), Mathematics Performance Test 2 (MPT_2) and Mathematics Retention Test (MRT) were the instruments used in collecting data as Pretest, Posttest and Post-posttest respectively. A Spearman-Brown coefficient of r = 0.89 was found. The data were analyzed using mean, standard deviation and t-test Analysis at 0.05 level of significance using statistical package for social sciences (SPSS),version 2016.Results of the study indicated that primary III pupils taught using ethnomathematics teaching performed and retained mathematical concepts better than those taught with conventional teaching method. The result also revealed no significant difference between the performance and retention of male and female primary III pupils taught mathematical concepts using ethnomathematics teaching strategy. The study revealed among others that ethnomathematics teaching strategy was gender friendly. The study recommended among others that mathematics teachers should endeavor to use ethnomathematics in teaching primary III pupils for better performance and retention of mathematical concepts in our primary schools. The results of the findings of the study suggests for further studies in different location of the country(Southern Nigeria). The findings of the study will benefit the mathematics educators, mathematics students , curriculum planners, government and non-governmental organizations among others.

CHAPTER ONE

THE PROBLEM

1.1 Introduction

For a long time many researchers in mathematics education have focused their attention on student learning difficulties in school mathematics mostly confined to the formal classroom environment highlighting that there also exist outside of the formal classroom other educationally significant factors having the potential to either enhance or retard effective learning of formal school mathematics (Matang & Owens , 2004) .

According to D'Ambrosio in 2001, ethnomathematics is "the study of different forms of mathematics that arise from different modes of thought." This definition is so broad that it can be used to describe the math that is practiced by the indigenous tribes in Africa as well as the math practiced by engineers that specifically relates to their field of interest

Retention is measured in collaboration with achievement. This means that closely related to achievement is retention. Hornby (2000) defines retention as the ability to remember experiences and things learnt. Similarly, kundu and Tutoo (2002) posited that retention is the preservation of mind.

Gender is also among the variables to be tested in this study. Nowadays, gender issues has assumed an important dimension in recent times as a result of increasing awareness of the moral implications of the dangers inherent in the marginalization of women in the science subjects including mathematics who form more than half of the world population

Mathematics constitutes a basic part of the National Curriculum for Primary schools as well as Secondary Education. The federal Government of Nigeria has for long been aware of the pivotal position of mathematics to individual fulfillments and national developmental goals with

particular reference to scientific and technological emancipation and break through. This understanding has consequently led educational policy makers to position mathematics as a compulsory and one of the core subjects in primary and secondary level of education (FME,2004).

The power structure that exists in Nigeria today originated in the colonial period, in the 19th century. This led to the imposition of a dominating Eurocentric cultural system on the country (Abbas, 2000) .Teachers in the country have increasingly been finding it difficult to get examples that are not Eurocentric. Consequently low achievement in school mathematics has been increasing and shows no sign of reversal (Abbas 2000, D'Ambrosio, 2001).

The Nigeria National curriculum included Hausa among the compulsory subjects in Primary and Secondary school (Waziri, 2010).This may be connected to the organized nature of the tribe, in terms of traditional administration (Sarki, Dagachi and MaiUnguwa), Scholarship and Commercial excellence of the language. In view of this development Hausa culture is rich with mathematical stuffs such as riddles, games, crafts, events, folklores, customs, objects and other traditional festivals.

To this backdrop there is a need to multi-culturalise the mathematics curriculum in order to improve its quality, to upgrade the cultural confidence of all learners and arrest any racial and cultural bias and stigma.

Hence, the researcher investigated the impact of using ethnomathematics in teaching on performance and retention in mathematics among primary III pupils in Lere educational district, Kaduna, Nigeria.

1.2 Statement of the Problem

There are more than 250 ethnic groups in the 21st century Nigeria. The largest and most politically dominant ones are the Hausa, Igbo and Yoruba. Other minor ethnic groups are the Fulani, Kanuri, Ibibio, Ijaw, Babur, Tiv, Idoma, Karekare and many others. Geographically, the three major ethnic groups are Hausa in the North, the Yoruba in the south-west and the Igbo in the south-east and our diversity is our strength due to our various cultural practices.

The low performance and retention rate in mathematics of students particularly among sex was attributed to instructional modality adopted by teachers. Some the researchers, recommended blended instructional techniques towards enhancing better retention and achievement. In view of the above situation there is need to develop or adopt teaching methods which are capable of improving the reasoning and logical ability of the learners to enable them retains concepts.

The mathematics taught in schools is foreign, Eurocentric in origin and built on western cultural background, making students to learn by rote memorization in which the attendant result is consistent mass failure of students. Hence students no longer have interest towards the study of the subject.

Therefore, the purpose of this research was to investigate the impact of using ethnomathematics could have on performance and retention in mathematics among primary III pupils in Lere educational district, Kaduna-Nigeria.

1.3 Objectives of the Study

The main of objective of this study is to investigate the impact of using ethnomathematics in teaching mathematics on performance and retention among primary III pupils in Lere education district, Kaduna-Nigeria. The specific objectives are to:

1. determine the impact of using ethnomathematics in teaching on performance in mathematics among primary school pupils.

2. investigate the impact of using ethnomathematics in teaching on retention in mathematics among primary school pupils.

3. find out gender differences on the impact of using ethnomathematics in teaching on performance in mathematics among primary school pupils.

4. determine gender differences on the impact of using ethnomathematics in teaching on retention in mathematics among primary school pupils.

Specifically, the study seeks to answer the following research questions.

1.4 Research Questions

1. What is the difference in the performance of pupils in the experimental group and control group in mathematics?

2. What is the difference in the retention ability of pupils in the experimental group and control group in mathematics?

3. What is the difference in the performance of male and female pupils taught mathematics using ethnomathematics and those taught using conventional lecture method?

4. What is the difference in the retention level of male and female pupils taught mathematics using ethnomathematics and those taught using conventional lecture method?

1.5 Null Hypotheses

The following null hypotheses will be formulated for testing at; $p \leq 0.05$ level of significance.

H_{01}: There is no significant difference between the performance of pupils taught mathematics using ethnomathematics and those taught using conventional method.

H_{02}: There is no significant difference between the retention level of pupils taught mathematics using ethnomathematics and those taught using conventional method.

H_{03}: There is no significant difference between the performance of male and female pupils taught mathematics using ethnomathematics and those taught using conventional lecture method?

H_{04}: There is no significant difference between the retention level of male and female pupils taught mathematics using ethnomathematics and those taught using conventional lecture method?.

1.6 Significance of the Study

The findings of the study benefitted the standard of mathematics education in the following ways:

The study would benefit the mathematics teachers to teach in line with the rationale for one of the most fundamental principles of education ,that is ,teaching from known to unknown. The study would benefit them to express the relationship between culture and mathematics and it would benefit them to understand how culture relates to students and their learning. It benefitted mathematics educators to reaffirmed, and in some instances to restored, the cultural dignity of the students.The research, also benefitted them in understanding the role that culture had played and continues to play in shaping mathematical development.

The study benefitted the students to learned mathematical concepts and appreciated the works of others in diverse cultures and reasonable despised them, making violence and hatred less likely to happen in schools. For instance, considering that voluminous information/data in a succinct manner, one cannot help it but admired the

minds of those who first created them. Also, it would benefitted the students in discovering that mathematical knowledge is a value-laden, and thus refuting the traditional approach of teaching and learning of mathematics as observed by D'Ambrosio(2001). The research, make the students to simply realize that they are mathematically capable and that they do in fact possess a long and rich mathematical heritage.

The study, would benefit the curriculum planners by compliment their efforts to considered multicultural mathematical activities that will reflect the knowledge and behaviors of people from diverse cultural environments. To acquire these skills while maintaining dignity and to be prepared for full participation in society the system require more than what is offered in a traditional curriculum. Much of today's curriculum is so disconnected from the child's reality, which is impossible for the child to be a full participant in it. The mathematics in many classrooms has practically nothing to do with the world that the students are experiencing .Just as literacy has come to mean much more than reading and writing , mathematics must also be thought of as more than , and indeed different from counting, calculating, or comparing . The study will help curriculum planners to understand and acknowledge mathematics as a compilation of progressive discoveries and inventions from cultures around the world during the course of history.

The study would benefitted the government and non- governmental organizations by complementing their efforts in the learning of formal school mathematics by providing the relevant contextual meaning to many abstract mathematical ideas which otherwise would be difficult for students to learn and understand.

The Professional bodies such as mathematics association of Nigeria (MAN), Science teachers association of Nigeria (STAN), Nigerian research development council (NERDC), would benefit from the study by training the prospective members on the effective use of ethnomathematics.

The study would guide the text book publishers to reframe text books on Mathematics to reflect the learner's cultural diversity and publish the identified mathematical practices in Hausa culture.

The research instruments used by the researcher in this study can be adapted or adopted by other researchers when investigating the effect of teaching methods in teaching primary III pupils.

The result of this study would also help the school administrators and policy makers to encourage mathematics teachers to adopt ethnomathematics teaching strategies when solving mathematical concepts. Researchers in mathematics education can benefit from the study, because it adds new information to the existing literature; hence researchers can use the findings of this study for further studies.

1.7 Scope/Delimitation of the Study

The study comprised of twenty two (22) primary schools in Lere education district, of Lere education authority of Kaduna state Nigeria .Two schools were sampled one as experimental group and the other school as the control group . Primary pupils are more appropriate for the study, because the use of mother tongue (Lm) and second language (L2) were allowed during teaching and learning processes. Therefore, the experimental group were taught using ethnomathematics and the control group were taught using conventional lecture method. The instruments used for data collection were mathematics performance test 1 (MPT_1),

mathematics performance test 2 (MPT_2)and mathematics retention test (MRT), the test item comprised of 20 objective test questions. The topics covered for the study were based on statistics, algebra, geometry and measurement. The researcher did not include any other cultural practices other than that of Hausa culture and the research was restricted to primary school pupils in Lere education district of Kaduna state, Nigeria.

1.8 Basic Assumptions

The study was carried out based on the following assumptions:

1. The pupils involved in this research are familiar with the Hausa culture such as language, cultural artifacts etc.

2. The teachers are using Eurocentric teaching approach to teach the primary schools' pupils the concepts of mathematics.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 **Introduction**.

This study investigated the impact of using ethnomathematics in teaching on performance and retention in mathematics among primary pupils III in Lere education district, Kaduna, Nigeria. This research seeks to determine the difference between the performance and retention in mathematics between the experimental group and control group and also to examine their performances and retention ability due to gender.

In this chapter the researcher presented the theoretical framework, a critical analysis of related research, studies related to the problem statement and research questions and conclusion.

2.1 Theoritical Framework

2.2 Conceptual Framework

2.3 Nature and Teaching of Mathematics in Primary Schools

2.4 Students' Retention in Teaching and Learning Mathematics

2.5 Academic Performance and Gender Issues in Mathematics

2.6 Definition and Meaning of Ethnomathematics

2.7 Importance of Ethnomathematics

2.8 Mathematics in Hausa Culture

2.9 Historical Overview of Ethnomathematics

2.10 Eurocentrism

2.11 The Use of Ethnomathematics as a Teaching-tool

2.12 The Efficacy of Ethnomathematics as a Pedagogical- Tool

2.13 Overview of Related Studies

2.14 Implications of the Reviewed Literature to the Present Study

2.1 **Theoretical Framework**

This study was guided by adapting the Culturally Relevant Education (CRE) Theory. Nieto (2000) affirmed that CRE was develop out of concern for the serious academic achievement gap experienced by low-income students, students of color, and students from linguistically and culturally diverse environments.

Gay (2000) stated that CRE uses the cultural knowledge, prior experiences, frames of reference, and learning styles of ethnically and linguistically diverse students to make learning more relevant and effective with the objective of strengthening student connectedness with schools and as consequence reducing behavioral problems and enhancing learning. Moreover,

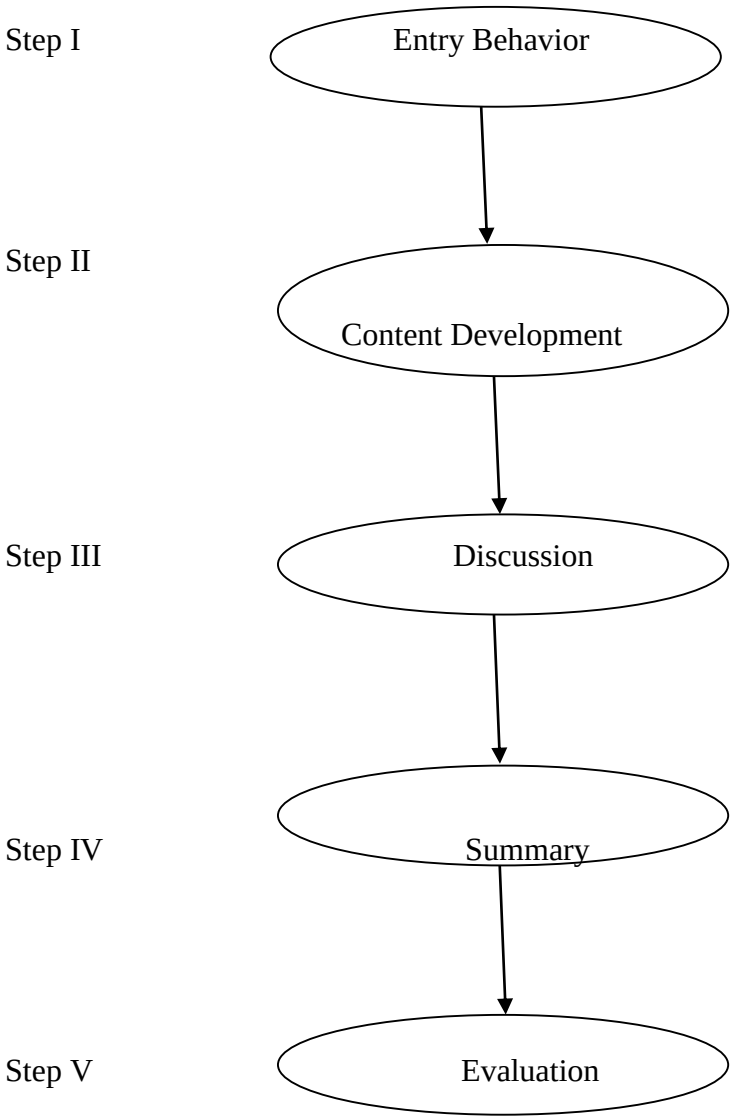
Gay (2001), State that Cultural characteristics provides the criteria for determining how instructional strategies should be modified for ethnical diverse students. Developing skills in this area should begin with teacher education students confronting the connect prior knowledge with new knowledge, the known with the unknown, and abstractions with lived realities.

Culturally relevant teaching model has the following phases:

1. **Instructional objectives**: this are the specific objectives that the teacher want to achieve at the end of the lesson.
2. **Instructional materials**: these are the local teaching materials (cultural artefacts) that the students are familiar with them within their environment and can enhance teaching and learning of the relevance concepts effectively and efficiently.
3. **Entry behavior**: the students' knowledge of cultural artifacts will be served as the previous Knowledge and the learning experiences that include student perspectives. The teacher should divides the students into groups and ask them to appoint a leader to each group and they should cooperate.

4. **Content development**: the teacher will explain the lesson by introducing the things seen around the environment.
5. **Discussion**: the teacher will leads the class discussion by asking the students questions based on the topic and what they observed in the environment and the students will participate actively by explaining the ideas learnt.
6. **Summary**: the teacher will summarizes the lesson based on the discussion and the students will write the summary note.
7. **Evaluation**: the teacher will evaluates the lesson by asking the students questions(oral) based on the lesson and the students will provide responses to questions asked by the teacher.

Figure 1: A flowchart describing the model for culturally relevant teaching approach.



Source: Patrick , 2015.

In line with this context, Rosa and Orey (2007) stated that one approach to culturally relevant pedagogy is to apply ethnomathematical perspective into the mathematics curriculum. Ethnomathematics studies the cultural aspects of mathematics. It presents mathematical concepts of the school curriculum for a way in which concepts are related to the students' cultural backgrounds (D'Ambrosio, 2001), thereby enhancing students' abilities to make meaningful

connections and deepening their understandings of mathematics. In so doing, there is a need to examine the embeddedness of mathematics in culture. Working towards those goals means it is necessary to draw from a body of literature that takes on the ELL students' cultural root of knowledge production into the mathematics curriculum in order to make school mathematics more relevant and meaningful to this school population and promote the overall quality of their education.

2.2 Conceptual Framework

Recent reports in mathematics education recognize mathematics as an integral part of culture just like language, arts, religion and other modes of explanation. With the spread of communications and consequent interest in cultural forms, the world faces new ways of doing things. These new ways of doing things are mathematical in nature (quantifying, measuring, inferring, counting, classifying and modelling).These ways have existed and progressing independent of conventional mathematics. These other forms of mathematical practices are mostly unrecognized in Nigerian culture. The cluster of other ways of mathematics is what is called Ethnomathematics. Ethnomathematics has been kept alive outside the academic and Western style of mathematics. In other words, ethnomathematics is the mathematics which is practiced among identifiable cultural groups such as the national tribe, societies, labour groups, children of certain age brackets or professional bodies.

The importance of cultural context has formed a central theme in a number of mathematics education research processes. For a very long period mathematics was geNerally considered to be culture-free and value–free knowledge. For this reason explanations of 'failure' and difficulty in school mathematics were sought either in terms of the learner's cognitive attributes, or in terms of the quality of the teaching they received. As a result, most attempts to

make mathematics teaching more meaningful and effective were sought from that quarter and social and cultural issues in mathematics education were rarely considered.

In the last few years there has been increasing questioning of the total reliance on European models of education in developing countries. Due to these growing concerns, the social dimension of mathematics has come into greater prominence in research in mathematics education. Young children learning "academic" mathematics are assumed to be experiencing no conflict with the Westernised mathematics. The assumption for this cultural consonance has geNerally been present for many years. Despite continual concerns about the difficulty children have in leaning mathematics and the feelings of anxiety provoked by mathematics teaching, explanations have been sought elsewhere (Abbas,2000).

The researcher's concern was to use the social group's specific practices of estimating the areas of land and estimating the volume of a tree trunk in teaching area and volume. The researcher pointed out that a student involved in the study knew the popular methods of calculating and estimating the volume of a tree trunk; before coming to school, and with the approach of ethnomathematics the students gained academic mathematics. The researcher concluded that pedagogical use of ethnomathematics tries to decodify popular knowledge by giving students the chance to become advance of the limitations of their methods and why local groups utilize the methods (Abbas, 2000).

In both studies the fundamental assumption guiding the curriculum study was that children's knowledge of traditional number, measurement and geometry concepts should be employed in the services of formal mathematical development. The study showed that adopting and extending traditional knowledge helps children define concepts that are not really expressible in local terms.

Ethnomathematics is an interdisciplinary field of research covering cultural anthropology, mathematics, mathematics education and mathematical cognition (Bishop, 2004; D'Ambrosio, 2001) hence for the purpose of this research, the researcher used D'Ambrosio's (2001) description which he describes it as "the term used to express the relationship between culture and mathematics" . He further elaborates that the term requires a dynamic interpretation because it describes concepts that are themselves neither rigid nor singular – namely, ethno and mathematics" Ethno describing all the elements that characterize the cultural identities of a group which include language, codes, values, jargon, beliefs, food and dress, habits, and physical traits on the other hand the broad view of mathematics include ciphering, arithmetic, classifying, ordering, inferring, and modeling (D'Ambrosio, 2001). For the purpose of this study, the term ethnomathematics was used to express the relationship between all culturally-embedded mathematical ideas and activities that can be used in any educational setting aimed at enriching deeper understanding of the formal concepts of mathematics taught in schools.

2.3 Nature and Teaching of Mathematics in Schools

Mathematics is found everywhere: in art, architecture, engineering, robotics, land surveys, astronomy, sculptures, space, nature, sports, machines, cars and much more. Mathematics is in every part of the primary schools curriculum and through secondary school to college and university, and it took very important position in primary school curriculum across the education jurisdiction. Geometric conceptions have been considered as a base for learning mathematics. The importance lies within the fact that mathematics is not only relating to mathematical courses, but also concerning with the development of students' cognitive skills, such as investigation, researching, criticizing, creative thinking, illustrating what they have learnt, and self-expression (Erdogan, et al 2009).

The teaching of mathematics provides not only a key vehicle for developing learners' spatial thinking and visualization skills, but also a major opportunity to develop their capability with deductive reasoning and proving (Battista, 2007). Even though, it remains uncertain what classroom factors might trigger productive mathematical reasoning and proof in school geometry lessons. However, research in mathematics education is continuing to document how mathematics teachers' instructional interventions impact on children's learning. Yet, as Hiebert and Grouws (2007) explain in their comprehensive review, there remains much to learn about the inter-relationships between teachers' practices and students' learning. Indeed, according to Hiebert and Grouws, robust theories of teachers' instructional practices do not yet, exist. In a mathematics lesson when students are trying to solve a problem, the teacher might suggest to the students where to direct their attention in the problem, which theorems might be used, and so on.

Poopola (2010) defined academic performance as an expression used to present students' scholastic standing and which is a function of various factors such as method of teaching, teacher qualifications, students home background, school environment, attitude, interest among others. Performance is defined as the observable or measurable behaviour of a person an animal in a particular situation usually experimental situation. This means that performance measures the aspect of behaviour that can be observed at a specific period. To determine performance, a performance test is conducted. Abu Rabia (2013) defined performance test as the type of mental test in which the subject is asked to do something rather than to say something. Performance test is the type of test which throws light on the ability to deal with things rather than symbols (Diver, 2012). Aikenhead (2005) and Usman (2008) observe the degree of Academic performance of a student is directly related to the quality of teaching technique they receive and

it determine the quality of knowledge impacted and material learned. Lakpini (2006) observed that a good number of teachers are highly deficient in the subject they teach.

2.4 Students' Retention in Teaching and Learning Mathematics

One of the important aims of school instruction as observed by Aggarwal (2008) is to encourage the learners to acquire and retain the knowledge imparted in school for future use in school life, and in meeting out-of school life problems of the present and future. Hence it is very essential to take proper steps to enable students retain and recall easily. Retention is the ability to retain and later recall information or knowledge gained after learning (Bichi, 2002). The term retention can be regarded as the process of relegation of experience in the sub-conscious mind of the individual in the form of mental experience (Aggarwal, 2008). Retention is one among the four main elements of memory (others are learning, recall and recognition). However, Mangle (2010) reported that these four elements have been replaced by three distinct stages (encoding, storage and retrieval). The storage stage is concerned with the power of retention of encoded information. Educational psychologists have used retention as one of the criteria for distinguishing between short term and immediate memory. Mangle (2010) ascertained that in immediate memory, the retention time is less than one second while in short term memory the period of retention can be extended to a quite a longer duration as a result of the proper efforts and rehearsal by learners. Retention of learned materials can be measured. Aggarwal (2008) identified four methods of measuring retention. These are recall or reproduction, relearning or saving method (this involve calculating the number of trials taken to learn materials in the beginning note down the saving of trials relearning it after some lapse of time); Recognition and reconstruction. A good memory retention lead meaningful learning, which is lead to the production of a series of changes within our entire cognitive structure. As well as modifying

existing concepts and forming new linkages between concepts as observed by Ausubel. Duration of active learning and distributed practice of academic content has influenced the level of academic retention (Belfiore, Skinner & Ferkins, 2006). The level of retention of mathematical knowledge also depends on the type of teaching method.

2.5 Academic Performance and Gender Related Issues in Mathematics

Gender is a socially ascribed attribute, which differentiates feminine from masculine. A number of studies have verified the influence of gender on mathematics achievement of students. This had led to series of divergent views on the influence of gender on the mathematics achievement and interest of students. Many research findings in Nigeria have shown that boys perform better than the girls in mathematics geNerally, despite the fact that they are put under the same classroom situation (Etukudo, 2005).Meanwhile other research findings have debunked the idea of sexual differentiation in ability. This school of thought said that there is no disparity in the performance of both boys and girls (Gbodi & Laleye, 2006). Caplan and Caplan (2005) even argued that the link between gender and the mathematics performance was very weak. Can test scores measure the real differences in cognitive abilities and abilities to solve mathematical problems between females and males? Review of other researches on gender difference led to the conclusions that there were gender differences in mathematical problem solving that favored males based on the fact that males samples outperformed female samples in their studies for example, (Stanley & Benbow, 2008). The results of the study conducted by Emmanuel etal (2010) provide empirical evidence that achievement in geometry depend on the method of instruction adopted and are not influenced by gender. However, interest of male and female students taught geometry using games and simulations differ significantly but group did not interact significantly with gender to influence students' interest.

Usman (2007) found out from his various studies that boys performed well in any "rigorous" work, while girls show to settle seated for less rigorous work. While Bichi (2008) believed that girls perform better than boys in problem solving type of activities. Studies on sex difference in mathematics especially in Nigeria, are aimed at encouraging female participation in mathematics in the schools. Some of research studies conducted within Nigeria are documented. Caplan (2005) studied the performance of students in modern mathematics achievement. In the study, male students consistently obtained significantly (p. 0.05) higher scores than their female counterparts. Similarly, the work of Obiom and Odiok (2006) on effects of sex and environment on mathematics achievement had a consistent result with caplan. Furthermore, Obiom and Odoik (2006) in their study state that sex is also a predicting factor in mathematics achievement. They reports that the junior secondary school female students demonstrated a greater deficiency in mathematics achievement test than their male counterparts did. On school type, the study showed that co-educational schools performed better than single-sex schools but that the single sex female school was the worst in performance. This sex factor in predicting mathematics achievement has attributed to several factors. For instance, Hyde (2006) states that teacher is a factor affecting female students' participation. The study shows that high achieving girls receive significantly less attention in mathematics class than high achieving boys from the teacher. The study also added that teachers interact more with male students than the female students in both blame and praise. The results obtain from the study of Okigbo and Osuafor (2008) showed that there was no significant difference in achievement of male and female mathematics students taught with mathematics laboratory. This finding is in line with the findings of Okonkwo (2007) who reported that students' gender has no significant effect on their achievement when taught with tangram puzzle game. However, the finding disagrees with the finding of Okereke (2006),

who reported gender as a significant factor in achievement when mathematics is taught with certain strategies/techniques. Ashafi and Areelu (2010) assert that in mathematics, boys achieved significantly higher than girls as a result of their retentive rate. In the view of Aiyedun (2000), There is no significant difference between the performance of boys and girls in mathematics and that they both retain equally well. This conflicting results call for continuous investigation especially with teaching strategies to bring equity in gender retention in mathematics.

2.6 Definition and Meaning of Ethnomathematics

The Brazilian philosopher of mathematics, Ubiratan D'Ambrosio, first coined the term "Ethnomathematics" in the 1970's in speeches emphasizing the influence of sociocultural factors on the teaching and learning of mathematics. Various definitions have been attached to this term all ranging from the general to the specific. According to ISGEM, the International Study Group on Ethnomathematics, a group started in 1985 and currently an affiliate of the National Council of Teachers of Mathematics, the definition they acknowledge is the one put forth by D'Ambrosio in 1985 whom describes ethnomathematics as "the mathematical practices of identifiable cultural groups." As further detailed on the group's website, the prefix 'ethno' refers specifically to small-scale indigenous societies and in the broadest sense "to any group, national societies, labor communities, religious traditions, and professional classes". The 'mathematics' part of the word refers to practices that include "symbolic systems, spatial designs, practical construction techniques, calculation methods, measurements in space and time, specific ways of reasoning and inferring, and other cognitive and material activities which can be translated to formal mathematical representation." According to D'Ambrosio in 2001, ethnomathematics is "the study of different forms of mathematics that arise from different modes of thought." This definition is so broad that it can be used to describe the math that is practiced by the indigenous

tribes in Africa as well as the math practiced by engineers that specifically relates to their field of interest. Moreover, in 2002, Knijnik described ethnomathematics as a "field of knowledge that studies cultural, social, and political dimensions of mathematics education." Dr. Daniel Orey in 2004, described ethnomathematics as the "study of culturally related learning styles, historical developments in mathematics, and technology, prominent people in various cultural contexts who have made contributions to the field of mathematics, cultural applications of 'nontraditional' mathematics and various forms of mathematics that draw upon the interests, abilities and talents of teachers and students." Kurumeh (2004) , defined ethnomathematics as the study of mathematics which takes into consideration the culture in which mathematics arises. She stresses further that, if we conceptualize mathematics as the development of structures and systems of ideas involving number ,pattern, logic and spatial configuration and then examine how mathematics arises and is used in various cultures, it is possible to gain a much deeper understanding of the subject.

Davidson (2000), ethnomathematics is the art or technique of explaining, knowing and understanding diverse cultural contexts.

2.7 Importance of Ethnomathematics

Mathematics has played an important role in the development of society from prehistoric times to the present; (Makarfi, 2001).Traditionally in mathematics classroom the relevance of culture has been strangely absent from the content and instruction .The result is that many students and teachers unquestioningly believe that no connection exists between mathematics and culture failing to consider other possibilities, they believed that mathematics is acultural, a discipline without cultural significance (D'Ambrosio, 2001).Ethnomathematics when adopted, will provides the necessary linkage between everyday cultural practices of mathematics and the

teaching and learning of the related but abstract concepts .This approach, is also in line with the rationale for one of the most fundamental principles of education ,that is ,teaching from known to unknown. Ethnomathematics teaching approach will help the students to learn mathematical concepts and appreciate the works of others in diverse cultures think differently, and that it would be reasonable to despise them ,making violence and hatred less likely to happen in schools. For instance, considering that voluminous information/data in a succinct manner, one cannot help it but admire the minds of those who first created them. Also, students will discover that mathematical knowledge is a value-laden, and thus refuting the traditional approach of teaching and learning of mathematics as observed by D'Ambrosio in the above quotation. Ethnomathematics is used to express the relationship between culture and mathematics and its help the teachers to understand how culture relates to children and their learning. An important component of mathematics education today is to reaffirm, and in some instances to restore, the cultural dignity of children. As our students experience multicultural mathematical activities that reflect the knowledge and behaviors of people from diverse cultural environments, they not only may learn to value the mathematics but, just as important, may develop a greater respect for those who are different from themselves. To acquire these skills while maintaining dignity and to be prepared for full participation in society require more than what was offered in a traditional curriculum. Much of today's curriculum is so disconnected from the child's reality, which is impossible for the child to be a full participant in it. The mathematics in many classrooms has practically nothing to do with the world that the students are experiencing .Just as literacy has come to mean much more than reading and writing , mathematics must also be thought of as more than, and indeed different from counting, calculating, or comparing. Ethnomathematics will complements the efforts of both the teacher and the learners in the learning of formal school

mathematics by providing the relevant contextual meaning to many abstract mathematical ideas which otherwise would be difficult for students to learn and understand. The research will make the students to simply realize that they are mathematically capable and that they do in fact possess a long and rich mathematical heritage .The study aimed at helping the mathematics educators and curriculum planners to understand and acknowledge mathematics as a compilation of progressive discoveries and inventions from cultures around the world during the course of history. The research is also aimed at enhancing the level of understanding for mathematics educators of the role that culture has played and continues to play in shaping mathematical development.

2.8 Mathematics in Hausa Culture

History of mathematics along south of the Sahara and contributed to abroad perspective on the area of mathematics called socio-cultural mathematics or ethno-mathematics of Africa (Shu'aibu, 2014). This refers to application of mathematics in lives of African people and the impact that African institutions had on the development of mathematics. Visual discrimination and visual memory were needed for survival on the wild environment of the Hausa land as represented in Dawakin kudu rocks arts of Kano state. Settlement pattern in Hausa culture describe the geometric know-how used in laying out the circular, spiral, conical, rectangular, rhombus and symmetries shapes in Hausa towns, cities and villages. Some figures illustrating Hausa geometric shapes. Similarly bee hives could bring real life to our mathematics classes when discussion on regular polygons such as: triangle, square, pentagon, hexagon, closed and curved surface polyhedron that are associated with bee well known insect in Hausa land. The idea can be used in Pythagoreans construction of 3-, 4-, 5-, and 6-gons as well as the solution of Isoperimetric problems of enclosing a given area with shortest possible circumference is to use a

regular n-gons. The higher the n-gons use the better and the best of them is a circle. Being a bee hives design pattern common in all Hausa land it touches a mathematics subjects area called TESSELLATIONS (Shu'aibu, 2014).

Most of the Hausa and African arts, architecture and design contain strip and plane patterns of bilateral and rotational symmetries. For example Hausa axial and symmetry in basketry, calabash painting, chairs making and curving and the shape of 'RUMBU'. In Hausa culture there are many games and riddles relevant to the development of mathematical ideas as illustrated in the table below:

Table 4: Mathematical games and riddles in Hausa culture

S/N	Hausa Riddles and Games	Mathematical concepts
1.	Dakin saurayibabukofa[kwai]	Geometry, construction, closure, etc
2.	Hikayar mutum da kare da kaza da dawa za su tsallake kogi a kan kwale kwale mai iya daukar abu guda daya tak da shi mutum. Yaya zai tsallake da su daya daya?	Logical thinking, arithmetic operation, problem solving, diagram probability, algebraic equation, etc
3.	Wawan mutum mai huda cikinsa [Allura da Zare]	Estimate, logical reasoning, observation, visual memory, geometry, function and limits, etc
4.	Kai yautaine	Resourceful, thoughtful, problem solver, transforming, change and dynamic, addition,

		abstraction, etc
5.	Shanuna dubu madaurinsu daya [Tsintsiya]	Counting, number bases, quantity, diagram, logical thinking, boundary, etc
6.	Aiki da hankali ya fi aiki da agogo	Logical thinking, time conscious, work done, problem solving, strategy, etc
7.	Dara, Carafke, Gala-gala, langa, Macukule, Jatau maimagani, Yarmero, Wayatsallakaka, kullekurchiya, malam na bakin kogi, tanko maikan bashi, etc	Recreation, counting, logical thinking, chance, probability, visual memory, diagram, arithmetic operation, substitution method, time conscious, problem solving, etc
8.	Tantabaru suka sauka far a kan bishiyar da ake kitso karkashinta ,sai mai kitson tace sannu dari wadda akeyi wakitsontace a’ a saidai in an hada kamarsu da rabin kamarsu. Saboda haka sunawa ne?	Logical thinking, algebraic equation, counting, problem solving, quantity, chance, sharing, etc
9.	Talleyana son ya tsunko mangoro guda biyu daga cikin lambu. Amma lambun yana da kofa guda goma kowacce kofa tana da maigadi. Masu gadin sukace masa duk mangoron da ya debo za su raba da shi daidai wadaida. Saboda haka mangoro nawaTalle zai debo?	Counting, logical thinking, problem solving, simultaneous equation, quantity, chance, probability, sharing, double, geometric progression, etc

Source: Shu’aibu, 2014.

2.9 Historical Overview of Ethnomathematics

When immigrants encountered Western culture, it was geNerally assumed that they should reject their native mathematical practices and learn Western mathematics, often in a harshly punitive educational environment that favored assimilation (Weiger, 2000). This strategy was adopted primarily by activists and advocates in post-colonial and developing nations (Greene,2000). By 2000, this approach had been vigorously criticized in the research literature on the subject. Although the literature in the field remains somewhat scattered, the vast majority of Publications that were introduced during the last decade advocate an approach that is closer to the aims and objectives of the late-1960s originators of ethnomathematics (Greene, 2000). Specifically, the consensus that now emerges from the literature advocates the use of culturally familiar materials, examples, and problems as a means of facilitating underrepresented minority students' ability to access and understand the concepts of formal Western mathematics (Weiger, 2000).

Culturally Relevant Education (CRE) is an educational approach that may provide ELL students' access to a rigorous academic curriculum. It also values the cultural experiences and knowledge of all students regardless of whether they are represented by dominant or non-dominant cultural backgrounds. Klotz (2006) defined CRE as an educational system "that honors, respects, and values diversity in theory and in practice and where teaching and learning are made relevant and meaningful to students of various cultures". This is a system that educates all students by incorporating their diverse emotional, social, cognitive, linguistic and cultural experiences into a successful teaching-learning environment. It combines an examination of the cultural and socioeconomic influences on teaching and learning. According to Rosa (2010), CRE includes knowledge along with a commitment to the challenging of social injustices and

reflections upon educational challenges by identifying obvious and subtle individual, institutional, linguistic, and cultural actions that perpetuate social structures .Cultural mathematics and its acquisition in traditional school settings. Moreover, Rosa and Orey (2007) argued that including cultural aspects in the curriculum have long-term benefits for mathematics learners. This means that cultural aspects contribute to recognizing mathematics as part of daily life, enhancing the students' ability to make meaningful connections, and deepening their understanding of mathematics. In this regard , Damazio (2004), agreed with this perspective by suggesting that pedagogical elements necessary to develop the mathematics curriculum are found in the school community. Adam, et al. (2003) and Rosa and Orey (2003) stated that a culturally relevant mathematics curriculum based on an ethnomathematical perspective infuses the students' cultural backgrounds in the learning environment in a holistic manner. One possibility for an ethnomathematical curriculum may be labeled as mathematics in a meaningful context in which students are given opportunities to relate their new learning experiences to knowledge and skills they have previously learned. According to Bandeira and Lucena (2004), mathematical curriculum conceived in an ethnomathematical perspective helps to develop mathematical concepts and practices that originate in students' culture by linking them to academic mathematics. The understanding of conventional mathematics then feeds back and contributes to a broader understanding of culturally based mathematical principles. The work of Lipka, (2002) in Alaska is an example of this type of approach to curriculum innovation. It is assumed that a curriculum of this nature motivates students to recognize mathematics as part of their everyday life and enhances their ability to make meaningful mathematical connections by deepening their understanding of all forms of mathematics. Culturally relevant education (CRE) instills ethics of care, respect, and responsibility in the "professionals who serve culturally and linguistically

diverse students" (Klingner, Artiles, Kozleski, Harry, Zion, Tate, Duran, & Riley, 2005) such as school leaders, teachers, and staff. In this regard, CRE creates and implements spaces for school leaders' and teachers' reflection, inquiry, and mutual support around issues of linguistic and cultural differences. It is necessary to integrate a culturally relevant curriculum into the existing mathematics curriculum. Torres-Velasquez and Lobo (2004) affirmed that this perspective is an essential component of culturally relevant education because it proposes that teachers contextualize mathematics learning by relating mathematical content to students' linguistic, cultural, and real-life experiences. Ashafi and Areelu (2010) assert that in mathematics, boys achieved significantly higher than girls as a result of retentive rate. In the view of Aiyedun, (2000), There is no significant difference between the performance of boys and girls in mathematics and that they both perform equally well. This conflicting results call for continuous investigation especially with teaching approach or strategies to bring equity in gender performance in mathematics.

2.10 Euro centrism: The studies in ethnomathematics in Europe are scarce. The outcomes of the non-exhaustive review are indicative of the progress of the ethnomathematics research in Europe. We dare an interpretation for this late development of ethnomathematics to Europe. The fact that ethnomathematics to a large extent, emerged as a contradiction to the domination of western mathematics seems to be one of the main reasons that ethnomathematics were developed later in Europe. Powell & Frankenstein (1997) suggest that ethnomathematics could contribute to the elimination of many false dichotomies such as 'practical, everyday knowledge' versus 'abstract, theoretical knowledge'. What is mostly discussed here is the fact of the domination of western mathematics and in geNeral, the western culture that, using an evolutionist schema evaluates any other culture in comparison to itself. For a long time, western mathematics are

appeared as an authoritative knowledge, as a corpus of cognition and perceptions that is preferential to others, since it is considered that are more close to the 'absolute truth'; the non-western mathematics are "measured" by 5 meter of western mathematics. There is no scientific perspective or any other that has not its roots to particular stories and prejudices; something that is imminent in human beings (Erickson & Murphy, 2002).

Figure 2: Eurocentric Approach on the Development of Mathematics



Ernest (2008), in this spirit, notes that many histories of mathematics, promote a simplified Eurocentric view of its development: Typically such accounts identify Mesopotamia and Egypt as the sites of preliminary work that provided the raw materials for mathematics. Based on this, the flame of 'real' mathematics was lit by the Ancient Greeks, kept alight by the Arabs during the Dark Ages, until when passed on like an Olympic torch, it blazed anew in modern Europe and her cultural dependencies (Ernest, 2008). A perception like this ignores the connection of mathematics with the corresponding culture, as well as the fact of major contributions to the corpus of academic mathematics of non-western cultures as the invention of the decimal place value system with zero in India is (Ernest, 2008). A lot of European cultures –we dare to use the plural since there is no single and unique culture in Europe- face these consequences. Although, the differences in European classrooms are not so obvious comparing with indigenous people in the country e.g. U.S.A. European classrooms have to deal with a lot of students coming from minority and marginalized groups. These challenges have their impact in math classes since mathematics education is an acculturation procedure (Stathopoulous, 2006). All groups that are marginalized and oppressed by the dominant culture and the educational system are facing more

problems since their culture is contemned. Thus, teachers—teachers of mathematics— face the challenges of teaching in multiethnic and multilingual classrooms that includes students belonging to the above groups. Cultural groups, such as Romany students do also contribute to the formation of current classrooms. The increasing number of movement of immigrants, refugees and other endogenous minority groups, like the Romany, has been changing the landscape in the European classrooms. The list of different cultural groups could still be added to but since lists will always be deficient, all the more because some distinctions are relevant only in a specific context, we use the all-embracing concept of cultural diversity (François, 2010). The debate on cultural diversity leads to the question of equity and social justice that has been pointed out as one of the main challenges in the (research) field of mathematics education. In Europe equity in mathematics education has become an important issue since basic education is mandatory and mathematical literacy has been seeing as a human right. However institutional education (e.g. schools, curricula , …) results in exclusion of a large number of students that do not succeed in schools, being most of them from cultural minority groups. Moreover student population in Europe is not only a much more cultural diverse group; their diversity has also a strong correlation with the achievements in education. The same observation has been done in de USA by Suárez-Orozco & Suárez-Orozco (2002). They observe that "today's immigrants are a much more diverse group than ever before in terms of educational background and skills" (2002). Due to the shifted multicultural settings in schools and the increased variety of cultural diversity, questions and challenges in the (research) community of mathematics educations has been changed. One important challenge is the background of the students; the valorization of students' socio-cultural roots and their previous knowledge. It is important to deal with this starting position because it contributes to the future learning of the students and it contextualizes

the act of learning. Indeed, the heterogeneity of the school population is expressed in various ways: language, behavior, habits,ways of enhancing the own knowledge, ways of giving meaning to school contents. In addition, when we talk about education we consider that educational processes happen within particular socio-cultural contexts, being school one of them. Indeed education is a vast process with the presence of several protagonists who use different strategies and learning technologies which are located mainly in the family, school and community (Moreira, 2007). Hence, an important issue for current thinking about educational inclusion is located at the epistemology of social groups. Since learning and its specific processes are socially and culturally situated, social group theory of learning and knowing emerges seven (7) as essential to frame the educational content and to give meaning to social practices –being it school or communities based practices. To the extent that education conducted by the school is based on assumptions and educational processes different from those usually carried out in domestic groups –which are reflected particularly in the substantial differences between rationalities, discourses and practices– children from social groups that are more familiar with the school's body of knowledge and artifacts have a higher probability of school success. Both the ethnographic research and theoretical/critical reflection have being show how school achievement is related in many different ways to the cultural background of students, which withdraws or is legitimated in schooling. Furthermore, the different life histories of the students are immersed in memories, affections and knowledge that demonstrate the existence of different relationship to knowledge and how learning are processed in different ways, based as they are in their own cultural epistemologies. In this sense, one of the educational function of schooling is seen as a way to connect and transfer discourses and practices among different social groups, being necessary to bear in mind that different types of knowledge are

embedded in their own contexts, which imply the presence of cognitive processes, forms of thinking, teaching and transmitting knowledge to new geNerations, leading even applications, objects, problems, objectives, technologies, and particular professions (Stathopoulou, 2005;Moreira, 2007).

Research in the field of ethnomathematics –even in Europe– is clearly showing that communities are locus of mathematical knowledge much of which is yet to be considered and legitimized in schools. Acting as a strong source of criticism of how the mathematical activity of different groups has been erased or ignored by schools, ethnomathematics has been questioning the disjunctions between home based and school-based mathematical practices. Ultimately the findings from ethnomathematics show how we need to go beyond Universalist and essentialist notions of mathematics and the need to build a more fluid and decentred mathematics that is based on everyday experience of mathematics, opening the door to the wealth of knowledge of various social groups. It is however necessary to think about how to interpret such perspective in the context of each particular educational setting because each one possess its own diversity and gives a meaning to it according to one experiences of the complex social fabric of present societies. Each classroom and each school imprints a particular dynamics that requires a different knowledge about the setting, the people and the culture. As Chuche points out, “in cultural construction, what comes first is the culture of the group, the local culture, the culture that joins individuals with immediate interaction with each other, and not the global culture of the larger collectivity.” (1999). Also, This is, an ethnomathematical perspective that leads to an innovative reflection in educational settings and thus can change the traditional educative paradigm with its depreciation of the experiences and knowledge that students bring from their culture and daily life. We are indeed aware of the pits and falls and the pedagogical implications of the

ethnomathematical perspective. In recent years strong criticisms are made to such implications (Adam, Barton & Allangui, 2003; Knijnik, 2006; Domite and Pais, 2009). These studies make aware of a counter effect by implementing ethnomathematical ideas into school curricula (e.g. social exclusion, de-substantialization of Other's culture, essentialist approaches to culture). This observation gives rise to a central question if the import of the concept 'ethnomathematics' benefits a European critical mathematics education that is looking for social justice and math education for all. In the frame of this paper we can only mention this topic, knowing that deepening this issue will be the focus of further research.

2.11 The Use of Ethnomathematics as a Teaching-Tool

Davison and Miller (1998) discussed the challenge of engaging students from ethnic cultural and racial minority backgrounds in Western curricula, with a particular emphasis on science and mathematics. The authors report that many educators who work with Native American students, in particular, express concern over the difficulty of developing an engaging approach to Western science and mathematics that successfully engages their students. According to the authors, the type of ethnomathematics and ethno science that completely disregard Western assumptions are of limited utility in public school settings. In these environments, it is important to find meaningful instructional methods that can be used to help students engage with the required curriculum. Therefore, the most advantageous approach to incorporating ethnomathematics into a public school curriculum is in using culturally significant examples and vignettes to illustrate conventional mathematical operations and calculations. Specifically, the authors report that Native American art can be used to teach students about patterns while quilts and loom beadwork can be used to demonstrate goemetry. Both of these examples use familiar cultural artifacts as a point of access to Western mathematical concepts.

The authors also note that these findings have implications for the training and instruction of pre-service teachers who are likely to work with populations of minority students. Greene (2000) states that professors of ethnomathematics are not trying to replace the great European thinkers who have shaped modern mathematics but instead they are blending European ideas with African, Asian, Native American, and other mathematical innovations, teaching both European and non- European practices. She offers examples of several professors who incorporate ethnomathematics into their daily teachings. For example, Robert N. Proctor, a professor at Pennsylvania State University, tells his students that the Mayans had the most accurate calendar in the world until the Gregorian reform calendar was adopted in 1582. Another example is Mr. Ron Eglash of Rensselaer's department of science and technology studies who discusses African geometric fractals and their application today.

2.12 The Efficacy of Ethnomathematics as a Pedagogical Tool

The core idea of ethnomathematics has evolved considerably in recent years, making a linear history of its application in classroom settings difficult (Malaty, 1998). In fact, a core deficiency of the existing published literature on the subject is the variation in the operational definition of what forms a curriculum or pedagogy informed by the tenets of ethnomathematics. Another shortcoming is the lack of clear, empirical evidence either supporting or discrediting the claims for the usefulness of ethnomathematics as a curricular construct or pedagogical methodology (Greene, 2000).However, based on the majority consensus in recently published assessments of ethnomathematics, there seems to be a strong sense that the use of culturally familiar contexts, examples, materials, and resources to facilitate minority students' understanding of the concepts and assumptions upon which Western mathematics is well-founded (Weiger, 2000).

2.13 Overview of Related Studies.

Onudiaku, (2013), conducted the study to ascertain the effect of ethno-mathematics teaching materials on students' achievement in mathematics. The sample for the study was 156 Senior Secondary Schools two (SSS 2) students, which were randomly selected from 16 Senior Secondary Schools in Igbo-Etiti Local Government Area of Enugu State through multi-stage sampling technique. The instrument used for the study was ethno-mathematics achievement test (ETHNOMAT). The data obtained with the instrument were analyzed using mean and Analysis of covariance (ANCOVA). Mean was used to answer the research questions posed, while ANCOVA statistic was employed in testing the null hypothesis at 0.05 significant levels. Findings of the study showed that the ethno-mathematic achievement test was effective in enhancing students' achievement in mensuration with particular reference to volumes of cylinder and hemisphere. It was recommended among others that ethnomathematics teaching materials should be incorporated in the Senior Secondary School mathematics curriculum as technique to be used by teachers in teaching the concepts of volumes of cylinders and hemispheres. More so, workshops/Seminars should be organized by professional bodies such as Science Teachers Association of Nigeria (STAN), Mathematical Association of Nigeria (MAN), among other bodies, to popularize and sensitize mathematics teachers on the use of ethno-mathematics teaching materials as approach in teaching students the concepts of volumes of cylinders and hemispheres. The study of Onudiaku (2013) did not indicate the population of the study from where the sample of 156 subjects was drawn. The researcher used multi –stage sampling technique which might have disturb the schools' activities and did not indicate whether equivalent or non-equivalent, whether classes made up of all males or all female or mixed classes.

In another study, Kurumeh et,al (2012) investigated the effect of ethnomathematics on Junior Secondary three (JSS3) students' academic performance and retention in statistics. The study aimed at determining whether any of the sexes (male and female) would retain statistics concepts more than the others when use ethnomathematics. The study was carried out in Obi and Oju education areas of zone C in Benue state of Nigeria using a sample size of 248 junior secondary three (JS3) students. The study employed Quasi- experimental design of non-equivalent but culturally homogenous group. Intact classes were used for both the experimental and control groups. The experimental group was taught using the ethnomathematics while control group was taught using conventional approach. Two research questions and two research hypotheses were formulated to guide the study. The results revealed among others that the ethnomathematics improved students' performance and retention in statistics than the conventional approach. The ethnomathematics did not significantly differentiate between the sexes (male and female) retention level in statistics.

Imoko, (2009), conducted a study and determined the effectiveness of ethnomathematics, ETA on students' achievement and retention in Locus. The study was carried out in education zone B of Benue State of Nigeria using a sample size of 253 Senior Secondary 2 (SS 2) students. It was a non- equivalent quasi experimental study which was guided by two research questions and two hypotheses. Locus Achievement Test (LAT) instrument with a reliability coefficient of 0.78 was used as pre, post and delayed tests though reshuffled each time. Answers to the research questions were given using mean and standard deviation while the hypotheses were tested at 0.05 significant level using a 2-way analysis of covariance (ANCOVA). Results from the analysis revealed that students exposed to ETA were superior in achievement and retention than those taught with conventional approach. Thus there were significant differences between

the mean score of the students taught Locus with ETA and those taught with the conventional approach in both achievement (F1, 248 = 241.317, p = 0.000) and retention (F1, 248 = 270.421,p = 0.000). The study therefore recommended training of mathematics teachers on the use of ethnomathematics in their daily lessons especially in Locus with a view to making learning meaningful, relevant and interesting. Imoko, (2009), did not indicate the population of the study from where the sample of 253 subjects was drawn. The researcher did not indicate whether classes made up of all males or all female or mixed classes.

Abiodun, (2015), conducted a study and investigated the effects of integrating ethnomathematics into secondary school mathematics curriculum for effective artisan creative skill development in Abia State, Nigeria. He employed a quasi-experimental research design. The study presented two experimental groups and one control group. Experimental group 1 was taught (raffia weaving) and experimental group 2 (pottery) by integrating ethnomathematics into the conventional teaching approach via demonstration and discussion respectively. The control group was taught (traditional building) without integrating ethnomathematics. Two research questions and two hypotheses guided the study. The population for this study was 407 Junior Secondary two students in all the public junior secondary schools in Isiala Ngwa North Local Government Area of Abia State. A simple random sampling technique was used to select 117 JS2 students. The instrument used for data collection was Artisan Skill Creativity Ability Test (ASCAT). The instrument was validated and the reliability index for ASCAT was 0.81. Mean, Standard Deviation and Mean Gain were used to answer the research questions while the Analysis of Covariance was used to test the hypotheses at 0.05 alpha level. The findings revealed that students taught by integrating ethnomathematics instructional approach via practical had the greatest mean gain in the acquisition of creative skills. There was a significant difference in the

creative skills acquired by students for artisan skills development when taught using EIA and CIA. It was recommended among others that mathematics teachers should practically integrate ethnomathematics instructional approach via practical. Abiodun, (2015), restricted the experimental group to demonstration method only while the control group to discussion method only.

Abbas (2000), conducted a research on the effectiveness of using children's refined conceptions of mathematical ideas and techniques (ethnomathematics) in the teaching of conventional mathematics in primary school. The study specifically aimed at finding out the effectiveness of using the mathematical character of Hausa geometrical ideas for teaching three-dimensional and two dimensional shapes in Primary Two. The study aimed to find out whether certain Hausa geometrical ideas *Tabarma* (mat),*gida mai kusurwa* (local rectangular house), *daki mai da'ira* (round hut), *akwati* (box) could be used in teaching cuboids, cylinders, circle and rectangles effectively.The hypothesis tested in the study was that there was no significant difference in achievement between those children taught the geometric academic concepts (cuboids, cylinders, circles and rectangles) using ethnomathematics and those taught the same concepts without Ethnomathematics. The study was conducted in Riruwai Primary School in Doguwa Local Government area of Kano State. The population of the study was constituted entirely by all Primary Two pupils in the three primary schools in Riruwai town, at Riruwai Central Primary School. Seventy (70) pupils of class two were further selected from the register of the class. The pupils were further divided at random into two groups, control and experimental groups. Each group had thirty-five students. Twenty-five of the total numbers of students involved in the study are females. Fifteen of the females were in the control group while ten were in the experimental group. The results of the study showed that the experimental group

performed significantly better than the control group .The results of the study also showed that the performance of the experimental group was higher and was more homogenous than the control group. Girls in the experimental group performed significantly better than their counterparts and boys in the control group.The results of his research indicated that using ethnomathematics in teaching conventional mathematics assists pupils greatly in understanding the concepts being taught.The finding of the study is that girls can perform even better than boys when appropriate ethnomathematics is used in teaching school mathematics. The advantage boys have over girls would be greatly reduced by using ethnomathematics in teaching academic mathematics.

2.14 Implications of the Reviewed Literature to the Study.

According to the literature on the subject, the worldview and operational paradigms that are evident in many non-Western cultures are not readily compatible with developing a familiarity with Western mathematics, precisely because of the significant degree to which Western culture is reflected in the dominant mathematics (Weiger, 2000). As a result, many proponents of a modified approach to ethnomathematics suggest using culturally relevant examples and contexts as a means of introducing underrepresented minority students to these concepts (Greene, 2000). Reflection on the social, cultural, and political dimensions of mathematics offers an important perspective for a dynamic and globalized modern society, which recognizes that all cultures and all people develop unique methods and explanations that allow them to understand, act, and transform their own reality. In this regard, Ethnomathematics is the study of mathematical ideas developed by different sociocultural groups and offers a contextualization of the curriculum that contributes to the elaboration of pedagogical practices in multicultural classrooms (Rosa & Orey, 2007b). An ethnomathematics-based program helps

school leaders and teachers to understand and accept the cultural roots of their students by valuing their mathematical ideas, practices, and previous knowledge as well as recognizing the applications of academic mathematics. Teaching mathematics through an ethnomathematical perspective reminds school leaders and teachers that information may be meaningless unless it is embedded in an appropriate cultural and contextual understanding. One of the most important implications of this study is to explore different methods of organizing mathematical ideas, practices, previous knowledge, and problem solving in the mathematics curriculum. In this regard, ethnomathematics explores how different cultures organize and classify mathematical knowledge. On the other hand, D'Ambrosio (2001) and Rosa and Orey (2003) stated that ethnomathematics program also supports the learning of academic mathematics because individuals from minority groups need to have equal access and be knowledgeable about the mathematics of the dominant culture.

Majority of researchers and theorists envisage this as a transitional step on the pathway to achieve a fully functional grasp of formal Western mathematics. Today, it is widely agreed that equitable economic opportunities and social justice for minorities are unlikely to be achieved by failing to ensure that they are well-versed in the dominant mathematical paradigm of Western culture (Greene, 2000). While deep immersion in ethnomathematics is now largely regarded as a transitional pedagogy to help minority of the students to gain access to the Western academic discourse, there are also benefits to engaging all students in multiculturally-oriented mathematics instruction. In addition to introducing students to unfamiliar cultural traditions, multiculturally-oriented mathematics instruction can also be employed as a mean of introducing the concept of critical cultural analysis, allowing students to identify many of the often-unrecognized traits and characteristics of their native culture (Greene, 2000).

Another important benefit that is associated with ethnomathematics in the literature is the emphasis on the significance of using mathematics as part of everyday life. This can be particularly useful for cultural minority students who may have difficulty distinguishing the usefulness and relevance of formal, Western mathematics to their lives (Edwards and Ruthven, 2003). By employing culturally-significant examples and contexts from everyday life, the often-substantial disconnect that students perceive as separating real life from the academic world can be minimized (Greene, 2000). Bishop (2000) affirmed that is not enough to teach students mathematics; it is necessary to educate them about mathematics, to educate them through mathematics, and to educate them with mathematics. This means that ethnomathematics draws from the cultural experiences and practices of individual students, their communities, and the society at large and uses them all as vehicles to not only make mathematics learning more meaningful but, more importantly, to provide students with the insights of mathematical knowledge as embedded in their social and cultural environment. In order for high schools to function as effective educational environments, the leadership must play an important role in bringing together the diversity that exists in these schools. In this regard, it is recommended that continued cultural proficiency training coupled with specific subject area training be made available to the staff. In this regard, if school leaders and teachers see the value of cultural diversity, they may discover and create ways to build bridges to their students. Therefore, in order to encourage the value of diversity, school leaders, teachers, curriculum planners and the government need to develop a sense of diversity within a school community by valuing the differences, which are manifest in students' lives and to use those differences as the basis for school teaching and learning process. A related benefit of using ethnomathematics as a component of formal, Western mathematics instruction is the heightened potential for parental

involvement. Many anecdotal reports in the literature report that engaging parents in processes such as curricular content development and the creation of culturally relevant models has served to strengthen the commitment of parents, and, by extension, the community as a whole, to the notion of formal instruction in mathematics and other academic subjects (Civil, 2002). Despite the significance of other methods of teaching mathematics cited in this study, the studies carried out in ethnomathematics revealed that Etnomathematics teaching approach was superior to other methods in increasing students' academic achievement, retention and interest in learning Mathematical concepts.

Furthermore, the studies under reviewed indicated that conventional teaching method is largely an inefficient method of motivating students to academic achievements and retention in mathematics. This is reflect in the poor performances and low retention rate of students at primary school leaving certificate(PSLC), Junior Secondary Certificate Examination and Senior Secondary School Certificate Examination (SSCE) levels, and within the limits of available literature, it has been shown that ethnomathematics, if used effectively influence the understanding of mathematical concepts.

The implication of the reviewed literature is that, the study and use of ethnomathematics particularly in early primary education could do much to improve the quality of mathematical learning and teaching at very little extra financial cost. Using ethnomathematics in the teaching of academic mathematics also implies that there need no longer be total reliance on textbooks which are rarely available in most public schools. This is so because the teacher will make use of the mathematics experience of the child at home to build the academic mathematical concepts. Just like the teaching of language, where the teacher deliberately uses what the child knows and feels to develop his/her linguistic skills. By drawing on the cultural experience and practices of

individuals and communities, ethnomathematics allows for an easier flow of scientific ideas with children, thereby reducing the cultural blocks.

However, the literature reviewed under this study revealed that several authors used different teaching methods to improve students' performances in different subjects. Nevertheless, the literature reviewed indicated that the studies were conducted in some other geographical areas with different culture apart from the area of the study. In addition, the level of students and content area of the syllabus covered in the studies were quite different with this study, because the present study would be conducted to primary schools' pupils of Kaduna state and the content area of the syllabus is primary III school mathematics (primary 1-3).These are the gaps that this study will intend to fill and make it different with the reviewed studies.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter contains the research methodology employed by the researcher during the conduct of the research such as the research design, population of the study, sample and sampling techniques among others and were explained under the following sub-headings:

3.1Research Design

3.2 Population of the Study

3.3 Sample and Sampling Techniques

3.4 Instrumentation

3.5 Validity of the Instruments

3.6 Pilot Testing

3.7 Reliability of the Instrument

3.8 Administration of Treatment

3.9 Procedure for Data Collection

3.10 Procedure for Data Analysis.

3.1 Research Design

The design used for the study was a quasi-experimental design with pre-test, post-test and delayed (post-posttest) design. This design was used because; it is not possible to have complete randomization of the subjects as this will disrupt school organization. Hence, intact classes were randomly assigned to experimental and control groups. The experimental group was taught using ethnomathematics while the control group was taught using conventional method. The teacher taught the experimental using ethnomathematics and the Control group taught same mathematical concepts but using conventional method. The impacts of these approaches were carefully determined and recorded. A pre-test, post-test and post-posttest were administered to the groups in mathematical concepts for the purpose of collecting data for the research. The pre-test and posttest scores helped the researcher determined the performance of the pupils in both the experimental and control group while the post-posttest scores helped the researcher to obtained the retention ability of the pupils in both the experimental and the control group. The research design was illustrated in figure 2.

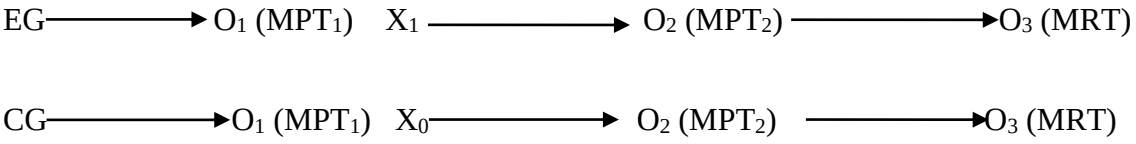


Figure 3: Research design illustrations.

Keys

EG=experimental group (taught mathematical concepts using ethnomathematics)

CG= control group (taught mathematical concepts using lecture method)

X1=experimental

X_o =control

O_1=pretest

O_2=posttest

O_3=delayed test (post-posttest).

MPT_1= Mathematics Performance Test 1

MPT_2= Mathematics Performance Test 2

MRT= Mathematics Retention Test

3.2 Population of the Study

The population of the study was made up of twenty two (22) public primary schools in Lere education district of Lere education authority, Kaduna state with the total population of eleven thousand two hundred and eighty nine(11289) pupils. All the schools were co-education. The average age of the primary pupils is ten (10yrs).The population consists of five thousand eight hundred and sixty two (5862) males and five thousand four hundred and twenty seven (5427) females .The population of the primary pupils was made up of one thousand eight hundred and eighty five (1885) males and one thousand seven hundred and ten (1710) females with the total population of three thousand five hundred and ninety five (3595) pupils. The details of the population based on the educational district were presented in Table 3.1

Table 3.1: Primary Pupils Enrollment in Lere Education District, Kaduna State-Nigeria.

S/NO	SCHOOL	MALES	FEMALES	TOTAL
1	DABO MUH'D MEMORIA MODEL PRIMARY SCHOOL,LERE	60	50	110
2	L.G.E.A SIGAU	156	125	281
3	UBE LERE II	125	95	220
4	UBE UNGUWAN MATO	98	70	168
5	UBE KAURAN DANGAMBO	114	106	210
6	LGEA DAMAU	117	90	207
7	LGEA YADIN LERE	110	112	222
8	NPS NAKERE	94	65	159
9	LGEA UNGUWAN MATO	121	97	198
10	LGEA UNGUWAN BAWA	151	133	284
11	UBE UNGUWAN TANKI	96	75	171
12	LGEA DAN'ALHAJI II	50	47	97
13	UBE UNGUWAN JIKA	95	53	148
14	UBE DAMAU	135	64	199
15	UBE UNGUWAN DODO	112	98	210
15	UBE JURAWA	87	35	122
16	UBE GAMAGIRA	76	48	124
17	UBE JURANKARI	133	72	205
19	NPS SULEJA	46	66	112
20	UBE DANJABA	87	78	165
21	LGEA SABON BIRNI	114	101	215
22	UBE UNGUWAN KAUCHI	67	52	119
	TOTAL	**1885**	**1710**	**3595**

Source: Lere Education Authority, (2016).

3.4 Sample and Sampling Technique

From the population of this study, a sample size of 207 participants were selected for the study and were viable for the study based on the suggestions that for a parametric tests (e.g t-test, ANOVA) to be employed 30-500 subjects would be the necessary sample size (Ross,2004) and in this research the t-test statistic was used to analyse the data. Lere education district was randomly selected for the study. In order to ensure that each school had an equal chance of being chosen, a simple random sampling technique was used to select two primary schools from Lere education district, of Lere education authority, Kaduna state. The sampled schools selected for the study were Dabo Muh'd Memorial Primary School, Lere and L.G.E.A Dan'alhaji II as the experimental and control group respectively. The researcher ensured that the sampled pupils have the same psychological factors in common regarding their chronological age, mental development, cultural background and mathematics experience. Table 3.2 shows the details of the samples that were selected for the study.

Table 3.2: Sample Schools for the Study.

S/N	Name of School	Group	Primary III Enrollment		
			Male	Female	Total
1.	D.M.M.P.S LERE	Experimental	60	50	110
2.	L.G.E.A DAN'ALHAJI II	Control	50	47	97
		TOTAL	120	87	207

3.5 Instrumentation

Instrumentation is the process of developing measuring devices and methods appropriate to a given evaluation or research problem. The research instruments used for this study are:-

1. Mathematics Performance Test 1 (MPT_1)
2. Mathematics Performance Test 2 (MPT_2)
3. Mathematics Retention Test (MRT)
4. Lesson Plans Using Ethnomathematics
5. Lesson Plans Using Lecture Method.

3.5.1 Mathematics Performance Test 1 (MPT_1)

Mathematics Performance Test 1(MPT_1) was developed by the researcher and determined the level of homogeneity between the experimental and control group. The test consisted of 20 multiple choice objectives items with options A-D, which are based on the topics covered on geometry,statistics, number and numeration and measurement. One correct answer and three distractors that made up the options which were drawn from primary III syllabus,2000-2011. The mathematics performance test 1 (MPT_1) and its marking scheme were presented in appendix A.

3.5.2 Mathematics Performance Test 2 (MPT_2)

Mathematics performance test 2 (MPT_2) was developed by the researcher and evaluated the effectiveness of the treatment. The instrument classified into two sections (section A&B), where section 'A' contained the bio data information of the subjects while section 'B' contained the items on mathematical concepts. The test consisted of 20 multiple-choice items with four alternative options each (A-D), which only one option stands as the correct answer while the other three options remain distracters. The answer scripts were collected and marked by the

researcher. The response of the respondents on the test was scored according to the key. The respondent that gives correct response to an item, he/she earned two score (i.e. 2 marks) for that item while zero score earned by a blank or an incorrect response. The MPT_2 and its marking scheme were presented in appendix B.

3.5.3 Mathematics Retention Test (MRT)

Mathematics Retention Test (MRT) was constructed by the researcher and evaluated the effectiveness of the treatment and the retention rate of the pupils. This test also consist of 20 multiple items with options A-D which were based on the topics covered (geometry, statistics, number and numeration and measurement). The answer scripts were collected and marked by the researcher. The MRT and its marking scheme were presented in appendix C.

3.6 Validity of the Instruments

Validity simply implies a degree or extent to which a test measure what it is expected to measure. For this purpose, the tests questions developed by the researcher from primary III school syllabus. The validity of MPT and MRT were determined by three experts in the area of Mathematics, Mathematics Education and Hausa Language with at least the rank of senior lecturers and a minimum qualification of Ph.D from the Department of Science, Science Education and Language Arts, Ahmadu Bello University Zaria, Kaduna State-Nigeria, respectively. The experts were given the instrument to check for their relevance, clarity of the language and any contradictions.

Where they made their observations on:

- ✓ The suitability of the instruments for testing students' academic performance
- ✓ The appropriateness of the instruments for the level of the students
- ✓ The existence of possible errors in the instruments

After the validation exercise, their useful and constructive suggestions led to re-framing and eliminations of some questions, which were found to be either sub-standard or ambiguous.For example,

1. What is the standard unit for measuring time?

   The experts corrected the question as what is the standard international unit(S.I. unit) for measuring time?

2. How many sides made a polygon to be called a hexagon.

   The experts corrected the question as how many sides a regular hexagon have?

3.7 Pilot Testing

The pilot testing was carried out using the instruments: Mathematics performance test (MPT) and Mathematics retention test (MRT) on 45 pupils of L.G.E.A Sabon-Birni, in Lere education district, Lere education authority of Kaduna state. The data obtained were analyzed to establish the reliability of the instruments. The instrument was administered first and second occasion with test-retest method within an interval of two weeks as recommended by Tuckman (1975). The test was conducted within the period of forty (40) minutes with the help of a mathematics teacher from the school. This allowed every pupil to have two different scores. The result of the pilot study was used to determine the reliability of the instrument. In addition, the result was used to show the appropriateness of the time allocated for the instrument and the feasibility of the study.The result of the pilot testing were presented in appendix Q.

3.8 Reliability of the Instrument

The reliability of a test refers to its freedom from unsystematic errors in measurement (Sambo, 2001). Unsystematic errors are those that occur as a result of

administrative conditions. Moreover, reliability of an instrument refers to test that will produce approximately same result when administered to the subject at any other time. Test-retest method was employed in obtaining the reliability coefficient. The interval between first and second administration of the test was two weeks as recommended by Tuckman, (1975). The reliability was established Using split-half method, a Spearman Brown equal length value reliability coefficient of 0.89 was achieved. The result of the reliability test was shown in appendix R.

3.9 Administration of Treatments

The study involved two different treatments which are; treatment with ethnomathematics and Conventional method. The treatments were administered to both experimental and control groups respectively. During the experimental group's treatment, the researcher conducted the lesson using ethnomathematics and the language of instruction used was Hausa language. Then, the researcher delivered the lesson by following the instructions and procedures contained in the lesson plan constructed on ethnomathematics (See appendix F) While for the control group, the researcher administered the treatment using conventional method of teaching and using English language as a medium of communication (See appendix G).

3.9.1 Treatment Using Ethnomathematics

Using ethnomathematics, the treatment was administered to the sampled group (experimental group) using ethnomathematics lesson plan. Using ethnomathematics explored the pupils to their culture such as language for the purpose of discovering some mathematical principles, patterns or process. These activities were carried out by the pupils with the helped of their teacher and make them explored, learned, stimulated interest and developed favorable attitudes towards Mathematics. More involvements of Pupils using ethnomathematics, helped in satisfying the creative and constructive urged of the pupils.

3.9.2 Teaching Control Group

The researcher conducted the teaching of control group in the normal classroom setting. The teaching was based on conventional approach where the teacher presenting the lectures and the students remained passive listeners. Although the lesson was conducted according to the lesson plan designed for the conventional lecture method of teaching (See appendix G).

3.10 Data Collection Procedure

Both the MPT and MRT were conducted during the school hours in order to avoid absenteeism and improve respondents' control. The MPT was administered to the students immediately after the treatment while the MRT was administered two weeks after the treatment. The purpose of the MPT is to determine the performance of the students while the purpose of MRT is to measure the retention rate of the students constituting the sample. The students spend 45 minutes each for the MPT and MRT. The answer scripts were collected immediately and marked by the researcher. The lists of scores of the pupils were recorded for males and females separately.

3.11 Data Analysis Procedure

This explained the procedures for statistical analysis used by the researcher and arrived at the decision on the hypotheses. Four research questions were answered using descriptive statistics by the use of mean and standard deviation while t-test statistic was used and analyzed the performance and retention level of the pupils in all the four null hypotheses formulated (i.e. Ho_1, Ho_2 , Ho_3 and Ho_4).

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSIONS

4.1 Introduction

This study examined the impaccts of using ethnomathematics in teaching on performance and retention in mathematics among primary III pupils in Lere education district, Kaduna- Nigeria .A quasi-experimental design was adopted and a simple random sampling technique was used and determined the sampled schools. Intact classes were used as the experimental group and Control group. The chapter was presented under the following sub-headings:

- Data Presentation
- Data Analysis
- Testing the Null hypotheses
- Summary of Major Findings
- Discussions

4.2 Data Presentation

Data obtained for the purpose of this study were analyzed using mean and standard deviation to answer research questions as follows:

1. The performance of pupils taught using ethnomathematics in teaching and those taught using conventional lecture method. The data collected were presented using descriptive statistics of mean and standard deviation as shown in Table 4.1

Table 4.1: Summary of the Mean and Standard Deviation of Post-test Scores for Experimental and Control group.

Variable	N	Mean(m)	S. D.	Mean Diff.
Experimental	110	25.29	3.21	
				8.02
Control	97	17.26	4.03	

From Table 4.1, the result of the descriptive statistics showed that "Experimental group (m=25.29, S.D=3.21) have the higher mean than the Control group (m=17.26, S.D=4.03) and there was a mean difference of 8.02 between the experimental and the control group scores.

2. Using Ethnomathematics in teaching on retention ability in mathematics and conventional lecture method.

The data collected were organized using descriptive statistics of mean and standard deviations as shown in Table 4.2.

Table 4.2:Summary of the Mean and Standard Deviations on Retention level for Experimental and Control Group.

Variable	N	Mean	S.D	Mean Diff.
Experimental	110	23.94	3.50	
				6.04
Control	97	17.90	5.62	

From the Table 4.2, the result revealed that the experimental group taught mathematical concepts using ethnomathematics (m=23.94 ,S.D=3.50) have the higher mean than the control group taught same mathematical concepts using conventional method(m=17.90

,S.D=5.62) there was a mean difference of 6.04 in the retention level of those exposed to ethnomathematics(experimental) and those exposed to conventional lecture method (control).. This established the facts that the treatment given to experimental group affects them positively in retaining mathematical concepts.

3. Using ethnomathematics in teaching and conventional method related to gender.

The data collected were analyzed using descriptive statistics of mean and standard deviation as shown in Table 4.3.

Table 4.3: Summary of the Mean and Standard deviation of Male and Female Performance Scores for experimental and control group.

Group	Variable	N	Mean	S.D	Mean Diff.
Experimental	Male	60	25.25	3.52	-0.09
	Female	50	25.34	2.83	
Control	Male	50	16.12	3.52	-2.35
	Female	47	18.47	4.22	

The Table 4.3 showed that, in the experimental group male (m= 25.25, S.D=3.52) and female (m=25.34 , S.D=2.83). This indicated that, there is a mean difference of -0.09 between the male and female performance scores. While in the control group male (m=16.12, S.D=3.52) and female (m=18.47 , S.D=4.22) .The result showed a mean difference of -2.35 performance scores.

4. Retention ability using ethnomathematics in teaching and conventional method.

The data collected were analyzed using a descriptive statistics of mean and standard deviation as shown in Table 4.4.

Table 4.4: Summary of the Mean and Standard deviation of Male and Female Retention Level for experimental and Control Group.

Group	Variable	N	Mean	S.D	Mean Diff.
Experimental	Male	60	24.18	3.62	0.54
	Female	50	23.64	3.37	
Control	Male	50	16.98	6.62	-1.89
	Female	47	18.87	4.56	

From the Table 4.4 the result revealed that, in the experimental group male (m=24.18 , S.D=3.62) and female(m=23.64 ,S.D=3.37) .While in the control group male(m=16.98 , S.D=6.62) and female (m=18.87 , S.D=4.56). This showed that, the male pupils belong to experimental group recorded higher mean than the male in the control group while the female pupils belong to experimental group recorded higher mean than the female in the control group. Therefore, there was a difference of 0.54 in the retention level between male and female pupils in the experimental group, Similarly in the control group the difference was -1.89 between the male and female pupils in the control group.

4.3 Testing the Null Hypotheses

The Data collected for the purpose of this study were analyzed using t-test statistics and tested the four(4) null hypotheses formulated for the study as follows:

Null Hypothesis 1: There is no significant difference between the performance of primary III pupils taught mathematics using ethnomathematics in teaching and those taught using conventional lecture method. The hypothesis was analyzed using t-test statistics. The result was presented in Table 4.5

Table 4.5: t-test Analysis of Pupils' Performance on Mathematics Performance Test for Experimental and Control Group

Group	N	Mean	S.D	SE_D	Df	t-cal	Pvalue	Decision
Experimental	110	25.29	3.21	0.31				
					205	3.19	0.000	*
Control	97	17.26	4.03	0.41				

* Significant at $P \leq 0.05$, Df = 205

From table 4.5 an independent sample t-test showed that the difference in test scores between the experimental group (n=110, m=25.29 ,S.D=3.21) and the control group (n=97 ,m=17.26 ,S.D=4.03) were significant. From Table 4.5, A P value of 0.000 was observed which was less than $P \leq 0.05$ at df = 205. This means that there is significant difference between the performance of primary III pupils in the experimental group and control group in favored of the experimental group. Thus, the null hypothesis which stated that; there is no significant difference between the performance of pupils taught mathematics using ethnomathematics in teaching aand those taught using conventional method of teaching was rejected.

Null Hypothesis 2: There is no significant difference between the retention ability of primary III pupils taught mathematics using ethnomathematics and those taught using conventional lecture method**.** The hypothesis was analyzed using t-test statistics. The result was presented in Table 4.6

Table 4.6: t-test Analysis of the Retention Level of Primary III Pupils in Mathematical Concepts for experimental and Control Group.

Group	N	Mean	S.D	SE_D	df	t-cal	P value	Decision
Experimental	110	23.94	3.50	0.33				
					205	9.39	0.000	*
Control	97	17.90	5.62	0.57				

*Significant at $P \leq 0.05$, Df = 205

From Table 4.6, an independent sample t-test showed that the difference in test scores between the experimental group (n=110, m=23.94 , S.D=3.50) and the control group(n=97 ,m=17.90 ,S.D=5.62) were significant. From Table 4.6, the P value observed (0.000) was less than $P \leq 0.05$ at df = 205. This means that there is significant difference between the retention level of primary III pupils in the experimental group and control group in favored of the experimental group. Thus, the null hypothesis which stated that; there is no significant difference between the retention level of pupils taught mathematics using ethnomathematics in teaching and those taught using conventional method of teaching was rejected.

Null Hypothesis 3: There is no significant difference between the performance of male and female taught mathematics using ethnomathematics in teaching and those taught using conventional lecture method. The hypothesis was analyzed using t-test statistics. The result was presented in Table 4.7**.**

Table 4.7: t-test Analysis of Pupils' Performance on Mathematics Performance Test for Male and Female in the Experimental and Control Group

Group	Gender	N	Mean	S.D	SE_D	df	t-cal	P value	Decision
	Male	60	25.25	3.52	0.45				
Experimental						108	-0.15	0.884	**
	Female	50	25.34	2.83	0.40				
	Male	50	16.12	3.52	0.50				
Control						95	-2.98	0.004	*
	Female	47	18.47	4.22	0.61				

* Significant at $P \leq 0.05$, df=95, * * Not Significant at $P \leq 0.05$,df=108

From table 4.7, an independent sample t-test showed that the difference in test scores between the male (n=60, m=25.25 , S.D=3.52) and female(n=50 ,m=25.34 ,S.D=2.83) in the experimental group were not significant. From the Table, the P value observed (0.884) was greater than $P \leq 0.05$ at df = 108. Thus, the null hypothesis which stated that; there is no significant difference between the performance of male and female taught mathematics using ethnomathematics in teaching was accepted.

From Table 4.7, an independent sample t-test showed that the difference in test scores between the male (n=50, m=16.12, S.D=3.52) and female(n=47 ,m=18.47 ,S.D=4.22) were significant. From the Table, the P value observed (0.004) was less than $P \leq 0.05$ at df = 108. Thus, the null hypothesis which stated that; there is no significant difference between the performance of male and female taught mathematics using the control group was rejected.

Null Hypothesis 4: There is no significant difference between the retention level of male and female pupils taught mathematics using ethnomathematics in teaching and those taught with

conventional method of teaching. The hypothesis was analyzed using t-test statistics. The result was presented in Table 4.8.

Table 4.8: t-test Analysis of Pupils' Retention Level for Male and Female Pupils in the Experimental Group and Control Group.

Group	Gender	N	Mean	S.D	SE_D	df	t-cal	P value	Decision
	Male	60	24.18	3.62	0.47				
Experimental						108	0.81	0.421	**
	Female	50	23.64	3.37	0.48				
	Male	50	16.98	5.85	0.83				
Control						95	-1.67	0.098	**
	Female	47	18.87	5.27	0.77				

* Significant at $P \leq 0.05$, * * Not Significant at $P \leq 0.05$.

From table 4.8, an independent sample t-test showed that the difference in test scores between the male (n=60, m=24.18, S.D=3.62) and female (n=50 ,m=23.64 ,S.D=3.37) in the experimental group were not significant. From the Table, the P value observed (0.421) was greater than $P \leq 0.05$ at df = 108. Thus, the null hypothesis which stated that; there is no significant difference between the retention ability of male and female taught mathematics using ethnomathematics in teaching was accepted.

From table 4.8, an independent sample t-test showed that the difference in test scores between the male (n=50, m=16.98, S.D=5.85) and female (n=47 , m=18.87 ,S.D=5.27) in the control group were significant. From the Table, the P value observed (0.098) was greater than $P \leq 0.05$ at df = 108. Thus, the null hypothesis which stated that; there is no significant

difference between the retention ability of male and female taught mathematics using the control group was rejected.

This indicated that there was significant difference in the retention ability of male and female pupils in the control group.

4.3 Summary of Major Findings

The findings of this study were summarized as follows:

- Pupils performed better in the learning of Mathematical concepts when exposed to ethnomathematics in teaching. This revealed that ethnomathematics teaching approach significantly improved the academic performance of primary III pupils.
- Pupils retained mathematical concepts better when taught using ethnomathematics teaching method. This showed that using ethnomathematics in teaching significantly improved the pupils' retention ability.
- Result revealed that male and female pupils performed better in the learning of mathematical concepts when exposed to ethnomathematics. This indicated that using ethnomathematics in was significant in teaching mathematical concepts to primary III pupils.
- Result revealed that both male and female primary III pupils retained mathematical concepts higher when exposed to using ethnomathematics in teaching. This indicated that ethnomathematics was gender friendly, because they equally retained the mathematical concepts taught to them during the lesson.
- Pupils participated actively during the lesson when taught using ethnomathematics in teaching than the pupils taught using the lecture method.

4.4 Discussions

The aim of this study was to examine the effects of ethnomathematics teaching approach on performance and retention in mathematics among primary III pupils in Lere education district, Lere education authority, Kaduna state, Nigeria. Mathematics performance test (MPT_1), Mathematics performance test (MPT_2) and Mathematics Retention Test (MRT) were the instruments used in collecting data as pretest, posttest and post-posttest respectively. Posttest is the instrument used to measure the pupils' Performance and post-posttest was the instrument used in measuring retention ability of the pupils. The collected data were analyzed using t-test statistics at 0.05 level of significant. The results of the analysis answered the research questions and tested the hypotheses.

The result in Table 4.1, showed that the experimental group performed better than the control group. The findings confirmed the studies of Imoko 2009, Kurumeh 2012 and Onudioku 2013, The results revealed among others that using ethnomathematics in teaching was effective in improving pupils' performance in mathematics than the conventional method.

The result in Table 4.2, showed that there is significant difference between the retention level of pupils in the experimental group and the control group. The difference observed showed that experimental group retained mathematical concepts learned higher than the control group. The result was in agreement with the findings of Kurumeh (2005) and Omenka (2010), which showed that pupils taught with new method could have higher retention ability than those taught with conventional lecture method.

The result in Table 4.3 revealed that, there was difference in the performance scores between male and female of the experimental group. But, the difference was not statistically

significant. The result was confirmed with that of Paden and Dereshiwsky (2007) and Omenka (2010), who attributed the low performance and retention rate in mathematics of students particularly among sex to instructional modality adopted by teachers. The result disagreed with that of Usman (2007) who compared the performance between male and female in practical activities, which revealed that male outperformed female in rigorous work. In addition, the findings disagreed with that of Caplan(2005),who confirmed gender difference in favor of male after investigating the effect of modern mathematics on performance of pupils.

Table 4.4 showed the difference in retention level between male and female in experimental. The difference was not statistically significant. This was due to the treatment received using ethnomathematics in teaching. The findings was in line with that of the other researchers such as Imoko (2009) which found that the pupils taught using ethnomathematics in teaching had a higher retention ability than those taught with conventional method. The result was also in line with the findings of Abbas (2000), who confirmed the effectiveness of using ethnomathematics in teaching primary school pupils.The results of his research, also indicated that using ethnomathematics in teaching conventional mathematics assists pupils greatly in understanding the concepts being taught. The advantage boys have over girls would be greatly reduced by using ethnomathematics in teaching academic mathematics.

From the result in Table 4.5 revealed that, there was significant difference between the performance of pupils taught mathematics using ethnomathematics in teaching and those taught using conventional lecture method. Thus, this implied that the null hypothesis was rejected. The significant difference was in favored of those exposed to ethnomathematics in teaching. The finding of this study was in line with the findings of other researchers, these includes; Imoko (2009), on the effectiveness of using ethnomathematics in teaching mathematics on pupils' achievement and

retention in locus. The result obtained showed that using ethnomathematics in teaching enhanced achievement in mathematics. Abiodun (2015), investigating the effects of integrating ethnomathematics into secondary school mathematics curriculum for effective artisan creative skills development and found that those taught by integrating ethnomathematics instruction via approach had the greatest mean gain in the acquisition of creative skills . Also, Abbas (2000) who conducted a research on the effectiveness of using in the teaching of mathematics in primary schools in Riruwai of Kano state and the result showed that the experimental group taught using ethnomathematics in teaching performed significantly higher than the control group taught using conventional method.

The result of the analysis on Table 4.6, showed that P value observed (0.000) is less than $P \leq 0.05$ at df = 205. This means that there was significant difference between the performance of pupils in the experimental group and the control group in favored of the experimental group. Thus, the null hypothesis which stated that; there is no significant difference between the performance of pupils taught mathematics using ethnomathematics in teaching and those taught using conventional method of teaching was rejected. The significant difference was in favored of the experimental group. This result was in agreement with that of Imoko (2009), on the effectiveness of using ethnomathematics in teaching mathematics on pupils' achievement and retention in locus. The result obtained showed that the use of ethnomathematics teaching approach enhanced achievement in mathematics. Abiodun (2015) investigating the effects of integrating ethnomathematics into secondary school mathematics curriculum for effective artisan creative skills development and found that those taught by integrating ethnomathematics instruction via approach had the greatest mean gain in the acquisition of creative skills . Also, Abbas (2000) who conducted a research on the effectiveness of using in the teaching of mathematics in primary schools in

Riruwai of Kano state and the result showed that the experimental group taught using ethnomathematics teaching approach performed significantly higher than the control group taught using conventional method. It is also in agreement with the findings of Kurumeh (2006) and Omenka (2010), which showed that ethno-method of teaching, enhanced better achievement in learners, which implied that retention was also enhanced since achievement was a function of retention.

The result of the analysis in Table 4.7, the P value of 0.884 was observed by the male and female in the experimental group which is greater than the p value of ≤ 0.05 at df = 108. This means that, there is no significant difference between the performance of male and female pupils in the experimental. Thus, the null hypothesis which stated that; there is no significant difference between the performance of pupils taught mathematics using ethnomathematics in teaching was accepted. Furthermore, this indicated that using ethnomathematics in teaching was gender friendly. Also, from Table 4.7, the P value of 0.004 was observed by the male and female in the control group which is less than the p value of ≤ 0.05 at df = 95. This indicated that there is significant difference in the performance of male and female pupils in the control group. Thus, the null hypothesis which stated that; there is no significant difference between the performance of pupils taught mathematics using conventional lecture method was rejected. The significant difference was in favored of the female pupils in the control group, who recorded the highest mean scores of 18.47 as against their counterpart with the mean scores of 16.12. This result is in agreement with the findings of Emmanuel etal (2010), that showed there was no significant difference in achievement in mathematics between male and female when taught using ethnomathematics teaching approach and Usman (2007) who investigated the relationship between pupils' performance in practical activities and their academic achievement, result revealed that boys performed well in any

"rigorous" work, while girls show to settle seated for less rigorous work. Also, the result of this research was not in support of the findings of Obiom and Odiok (2006), who concluded that there were gender differences in mathematical problem solving that favored males based on the fact that male samples out performed female samples in their studies.

From the result of the analysis in Table 4.8, the result revealed that both male and female subjects in the experimental group who were taught using ethnomathematics in teaching benefited and retained mathematical concepts more in the instruction than their counterpart in the control group and the difference between the retention scores of male and female subjects in the experimental group was not statistically significant. The result of this research is in agreement with the findings of Kurumeh, Onah and Mohammmed (2012), who in their study on Improving Pupils' Retention in Junior Secondary School Statistics using Ethno-mathematics Teaching Approach, concludes that there was no significant difference in the retention rate of male and female pupils taught statistics using ethnomathematics, showing that both males and females in the retained statistics knowledge equally well and improved their retention ability . Also, the result of this study was in agreement with the findings of Paden and Dereskiwsky (2007) in their study that revealed that low retention rate in mathematics of pupils particularly among sex was as a result of instructional modality adopted by teachers. On the other hand the result also, in agreement with that of Imoko (2009) which revealed that male in experimental group retained higher than their counterpart in the control group.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study investigated the impacts of using ethnomathematics in teaching on performance and retention in mathematics among primary III pupils in Lere education district, Kaduna, Nigeria. This chapter discussed the findings of the current study in light of relevant research. The chapter was presented in the following sub-headings:

- Summary
- Conclusion
- Recommendations
- Contributions to Knowledge
- Limitations of the Study
- Suggestions for Further Studies

5.2 Summary

The study examined the impacts of using ethnomathematics in teaching on performance and retention in mathematics among primary III pupils in Lere education district, Kaduna- Nigeria.

The results of this study revealed that pupils taught using ethnomathematics in teaching approach significantly performed and retained mathematical concepts taught to them better than those taught using conventional lecture method. Furthermore, the findings revealed that, there was no statistically significant difference between the performance and retention ability of male and female taught using ethnomathematics. This revealed that using ethnomathematics in teaching mathematics to primary III pupils was gender friendly. Also, result of the findings revealed that,

there was statistically significant difference between the performance and retention ability of the pupils in the control group.

5.3 Conclusions

Based on the findings of this study, the following conclusions were drawn:

The used of ethnomathematics in teaching mathematics enhanced the academic performance and retention ability among primary III pupils mathematical concepts than those taught using conventional lecture method.

In addition, the used of ethnomathematics in teaching mathematics helped male and female pupils performed and retained the mathematical concepts taught to them better than the control group taught using conventional method. This was due to fact that, the method provided opportunities for the learners to use their culture during the teaching and learning of mathematical concepts. Therefore, ethnomathematics was gender friendly.

5.4 Recommendations

Based on the findings of this study, the following recommendations were made:

1. It was found in this study that, using ethnomathematics in teaching improved pupils' performance and retention ability. Therefore, the Mathematics teachers should be using ethnomathematics in teaching mathematics.
2. The Kaduna state Government should emphasize the use of ethnomathematics in teaching mathematics through the use of the identified mathematical practices within the immediate community during teaching and learning in primary schools.
3. The Kaduna State Ministry of Education in collaboration with professional bodies, such as Mathematics Association of Nigeria (MAN), Science Teachers Association of Nigeria (STAN) and National Teachers Institute (NTI) should organize Seminar, workshops and

conferences in order to train the mathematics teachers in our primary schools on the identified cultural practices in the state.

4. In addition, textbook publishers should publish textbooks that contain the identified cultural practices within the state and the guidelines and procedures for teaching mathematics using ethnomathematics in teaching the primary school pupils.
5. Parent Teachers Association and Non-Governmental Organization can assist by providing instructional materials that will enable mathematics teachers to teach mathematics using ethnomathematics in teaching mathematical concepts effectively.

5.5 Contributions to Knowledge

The main contributions of this study are:

1. The findings of this study have added new information to existing literature that is the identified cultural practices in Lere educational district of Kaduna state.
2. The identified mathematical practices in this study can be used in designing the curriculum that will reflect the culture of the immediate community.

5.7 Limitations of the Study

This study has the following limitations:

1. The used of intact classes during the conduct of the study have made the subjects used in this research not completely randomized.
2. Cultural diversity of the pupils also influences the results of the study.

5.8 Suggestions for Further Studies

The following are the suggestions for further studies:

i. Similar research should be conducted in another state in the southern part of the country with different culture using the same tools and level of pupils in order to confirm or disagree with the situation in Kaduna state.

ii. Further research work on the use of ethnomathematics in teaching could be extended to all levels of primary school pupils to junior secondary students to senior secondary students so as to provide detailed and thorough investigation needed to understand the practices of effective teaching and could also enable researchers to observe how it affect the learners' performance in terms of understanding.

iii. The results obtained in this research are for primary III pupils in primary schools, the research can therefore, be extended to other areas of mathematics curriculum at all levels of pupils ranging from primary school pupils to junior secondary students to senior secondary school students to tertiary institutions.

iv. The identified mathematical practices within the culture should be documented and published. This will enable the mathematics to put them into practices during the teaching of related but abstract mathematical concepts.

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APPENDIX A

MATHEMATICS PERFORMANCE TEST 1(MPT_1)

SASHI NA A: BAYANAI A KAN DALIBI (BIODATA)

Sunan makaranta----------
Aji----------Lamban Dalibi----------
Jinsi: Namiji [ ] Mace [ ]
Shekaru----------

SASHI NA B: KA'IDOJI

Umarni:
Karanta wadannan ka'idoji cikin tsanaki kafin ka zabi amsarka.

1. Yi amfani da fensir wajen rubuta amsar ka.
2. Rubuta sunan makaranta, aji da lambar ka/ki a gurin da aka tanadar cikin takardan sanya amsa.
3. Karanta kowanne tambaya da kyau kafin ka/ki zabi amsa.
4. Ka/ki cike harafin da ya yi daidai da amsar tambayan a cikin takardan zaben amsa
5. Zabi amsa kwara daya daga cikin amsoshin kowacce tambaya.

AMSA WADANNAN TAMBOYOYIN TA HANYAR ZABAN AMSA DA SHI NE DAIDAI

1. Gano matsakaicin kidaya(m.k) na wadannan lambobi guda hudu:1,3,3,5

   a) Hudu(4) (b) uku(3) (c) biyu(2) (d) biyar (5)

2. Gano rabin jimillar aduda(j.a) na wadannan lambobi guda uku:3,1,5

   a) Daya(1) (b) biyu(2) (c) uku(3) (d) biyar (5)

3. Gano abin da ya fi yawan fitowa cikin wannan lambobi guda hudu:1,3,2,1

   a) Daya(1) (b) biyu(2) (c) uku(3) (d) biyar (5)

4. Ware bare daga cikin wadannan dangane da shakali mai gefe hudu masu tsawo daya.

   a) Dukkan geffa tsawon su daya ne b) duka lunguna hudu yawan su daya

   c) kowanne lungu yawansa dirja casa'in d)kowanne gefe tsawonsa daban

5. Shakali mai gefe biyar shi ake kira da suna ?

   a) hekzagon b) fentagon c) oktagon d) dekagon

6. Shakali rufaffe mai gefofi guda uku ko kuma fiye da haka shi ake kira da ----

   a) Shakali mai gefofi da dama b) Shakali mai gefe hudu c) alwatika d) babu daya daga ciki.

7. Wani ma'auni ne duniyar ilimi ta yarda a gwada lokaci da shi ?

   a) dakika b) Kwanaki c) karfe d) satikai

8. Ware bare daga cikin wadannan abubuwan da ake gwada tsawo da su.

   a) kilomita b) mita c) Giram d) santimita

9. Yanayin fara wane abu zuwa kammalawa shi ake kira da ----

a) tsawo b) kwana c) lokachi d) sati

10. Hekzagon yana da gefofi guda nawa ne ?

a) shida (b) biyu (c) uku (d) biyar

11. Wanne ne cikin wadannan misalai na shakali mai gefe hudu ?

a) murabba'i b) da'ira c) alwatika d) kusurwa

12. Kwanaki nawa ne suke daidai da sati guda ?

a) shida b) goma c) bakwai d) takwas

13. Ware bare dangane da abubuwan da ke kunshe a da'ira

a) marabin da'ira b) rabin marabin da'ira c) tsirkiya d) zati

14. Canza awoyi biyu zuwa (2hr) zuwa mintuna.

a) mintuna sittin b) mintuna dari c) mintuna dari da ashirin d) mintuna dari biyu

15. Samo kewayen shakali mai gefe hudu masu tsawo daidai, wanda ke da tsawon mita hudu(4m)

a) mita takwas b) mita goma c) mita goma sha shida d) mita ashirin

16. Digiri (Dirja) nawa ke daidai da layi mikakke ?

a) dirjoji casa'in b) dirjoji dari da tamanin c) dirjoji dari uku da sittin d) dirjoji dari

17. Idan aka raba ma mutane shida Nera dari da ashirin,nawa kowannensu zai samu ?

a) Nera talatin b) Nera ashirin c) Nera hamsin d) Nera ashirin da biyar.

18. Idan aka riba biyar gida goma nawa za'a samu ?

a) hamsin b) dari c) sittin d) saba'in

19. Lungu wanda ya fi digiri(dirja) sifili amma kuma bai kai dirjoji casa'in ba($0^0<x<90^0$) shi ake kira da suna ------?

a) lungu mikakke b) lungu mai tsini c) lungu mai fadi d) layi mikakke

20. Idan aka debe Nera dari daga cikin nere dari hudu nawa ne zai ragu ?

a) Nera dari biyu b) Nera dari uku c) Nera dari uku da hamsin d) Nera dari biyu.

MARKING SCHEME FOR MATHEMATICS PERFORMANCE TEST 1(MPT1)

1. B
2. C
3. A
4. D
5. B
6. A
7. A
8. C
9. C
10. A
11. A
12. D
13 .C
14. C
15. C
16. B
17. B
18. A
19. B
20. B

APPENDIX B

MATHEMATICS PERFOMANCE TEST 2(MPT2)

SASHI NA A: BAYANAI A KAN DALIBI (BIODATA)

Sunan makaranta----------
Aji----------Lamban Dalibi----------
Jinsi: Namiji [ ] Mace [ ]
Shekaru----------

SASHI NA B: KA'IDOJI

Umarni:
Karanta wadannan ka'idoji cikin tsanaki kafin ka zabi amsarka.

1. Yi amfani da fensir wajen rubuta amsarka.
2. Rubuta sunan makarantan, aji da lambar ka/ki a gurin da aka tanadar cikin takardan sanya amsa.
3. Karanta kowanne tambaya da kyau kafin ka/ ki zabi amsa.
4. Ka/ki cike harafin da ya yi daidai da amsar tambayan a cikin takardan zaben amsa
5. Zabi amsa kwara daya daga cikin amsoshin kowacce tambaya.

AMSA WADANNAN TAMBOYOYIN TA HANYAR ZABAN AMSA DA SHI NE DAIDAI

1. Gano matsakaicin kidaya(m.k) na wadannan lambobi guda hudu:1,3,3,5

   b) Hudu(4) (b)uku(3) (c)biyu(2) (d) biyar (5)

2. Gano rabin jimillar aduda(j.a) na wadannan lambobi guda uku:3,1,5

   b) Daya(1) (b) biyu(2) (c) uku(3) (d) biyar (5)

3. Gano abin da ya fi yawan fitowa cikin wannan lambobi guda hudu:1,3,2,1

   b) Daya(1) (b) biyu(2) (c) uku(3) (d) biyar (5)

4. Ware bare daga cikin wadannan dangane da murabba'i (square).

   b) Dukkan geffa tsawonsu daya ne b) duka lunguna hudu yawansu daya

   c) Gefe biyu ne tsawonsu daya d) Yana da gefofi guda hudu

5. Shakali mai gefe biyar shi ake kira da suna ?

   a) hekzagon b) fentagon c) oktagon d) dekagon

6. Shakali rufaffe mai gefofi guda uku ko kuma fiye da haka shi ake kira da ----?

   a) Shakali mai gefofi da dama b) Shakali mai gefe hudu c) alwatika d) babu daya daga ciki.

7. Wani ma'auni ne duniyar ilimi ta yarda a gwada lokaci da shi ?

   a) dakika b) Kwanaki c) karfe d) satikai

8. Ware bare daga cikin wadannan abubuwan da ake gwada tsawo da su.

   a) kilomita b) mita c) Giram d) santimita

9. Yanayin fara wane abu zuwa kammalawa shi ake kira da ----

a) tsawo b) kwana c) lokachi d) sati

10. Hekzagon yana da gefofi guda nawa ne ?

b) shida (b) biyu (c) uku (d) biyar

11. Wanne ne cikin wadannan misalai na shakali mai gefe hudu (quadrilateral)

a) murabba'i b) da'ira c) alwatika d) d) kusurwa

12. Kwanaki nawa ne suke daidai da sati guda ?

a) shida b) goma c) bakwai d) takwas

13. Ware bare dangane da abubuwan da ke kunshe a da'ira

a) marabin da'ira b) rabin marabin da'ira c) tsirkiya d) zati

14. Canza awoyi biyu zuwa (2hr) zuwa mintuna.

a) mintuna sittin b) mintuna dari c) mintuna dari da ashirin d) mintuna dari biyu

15. Samo kewayen murabba'i, wanda ke da tsawon mita hudu(4m)

a) mita takwas b) mita goma c) mita goma sha shida d) mita ashirin

16. Digiri nawa ke daidai da layi mikakke ?

a) digiri casa'in b) digiri dari da tamanin c) digiri dari uku da sittin d) digiri dari

17. Raba ma mutane shida Nera dari da ashiri,nawa kowannensu zai samu ?

a) Nera talatin b) Nera ashirin c) Nera hamsin d) Nera ashirin da biyar.

18. Idan aka riba biyar gida goma nawa za'a samu ?

a) hamsin b) dari c) sittin d) saba'in

19. lungu wanda ya fi digiri sifili amma kuma bai kai digiri casa'in ba($0^0<x<90^0$) shi ake kira da ------?

a) lungu mikakke b) lungu mai tsini c) lungu mai fadi d) layi mikakke

20. Idan aka debe Nera dari daga cikin nere dari hudu nawa ne zai ragu ?

a) Nera dari biyu b) Nera dari uku c) Nera dari uku da hamsin d) Nera dari biyu.

MARKING SCHEME FOR MATHEMATICS PERFORMANCE TEST 2(MPT2)

1. B
2. C
3. B
4. C
5. B
6. A
7. A
8. C
9. C
10. B
11. A
12. C
13. D
14. C
15. C
16. B
17. B
18. A
19. B
20. B

APPENDIX C:MATHEMATICS RETENTION TEST(MRT)

SASHI NA A: BAYANAI AKAN DALIBI (BIODATA)

Sunan makaranta----------
Aji----------Lamban Dalibi----------
Jinsi: Namiji [ ] Mace [ ]
Shekaru----------

SASHI NA B: KA'IDOJI

Umarni:
Karanta wadannan ka'idoji cikin tsanaki kafin ka zabi amsarka.

1. Yi amfani da fensir wajen rubuta amsarka.
2. Rubuta sunan makaranta,aji da lambar ka/ ki a gurin da aka tanadar cikin takardan sanya amsa.
3. Karanta kowanne tambaya da kyau kafin ka/ko zabi amsa.
4. Ka/Ki cike harafin da ya yi daidai da amsar tambayan a cikin takardan zaben amsa
5. Zabi amsa kwara daya daga cikin amsoshin kowacce tambaya.

AMSA WADANNAN TAMBOYOYIN TA HANYAR ZABA AMSA DA SHI NE DAIDAI

1. Canza awoyi biyu zuwa (2hr) zuwa mintuna.

   a) mintuna sittin b) mintuna dari c) mintuna dari da ashirin d) mintuna dari biyu

2 . Samo kewayen murabba'i, wanda ke da tsawon mita hudu(4m)

   a) mita takwas b) mita goma c) mita goma sha shida d) mita ashirin

3. Digiri (Dirjoji) nawa ke daidai da layi mikakke ?

   a) digiri casa'in b) digiri dari da tamanin c) digiri dari uku da sittin d) digiri dari

4. Raba ma mutane shida Nera dari da ashiri,nawa kowannensu zai samu ?

   a) Nera talatin b) Nera ashirin c) Nera hamsin d) Nera ashirin da biyar.

5. Shakali mai gefe biyar shi ake kira da suna ?

   a) hekzagon b) fentagon c) oktagon d) dekagon

6. Gano matsakaicin kidaya(m.k) na wadannan lambobi guda hudu:1,3,3,5

   c) Hudu(4) (b)uku(3) (c)biyu(2) (d) biyar (5)

7. Gano rabin jimillar aduda(j.a) na wadannan lambobi guda uku:3,1,5

   c) Daya(1) (b) biyu(2) (c) uku(3) (d) biyar (5)

8. Gano abin da ya fi yawan fitowa cikin wannan lambobi guda hudu:1,3,2,1

   c) Daya(1) (b) biyu(2) (c) uku(3) (d) biyar (5)

9. Ware bare daga cikin wadannan dangane da murabba'i.

   c) Dukkan geffa tsawonsu daya ne b) duka lunguna hudu yawansu daya

c) Gefe biyu ne tsawonsu daya d)Yana da gefofi guda hudu

10. Shakali mai gefofi guda uku ko kuma fiye da haka shi ake kira da ----?

a) Shakali mai gefofi da dama b) Shakali mai gefe hudu c) alwatika d) babu daya daga ciki.

11. Idan aka ribanya biyar gida goma nawa za'a samu ?

a) hamsin b) dari c) sittin d) saba'in

12. Lungu wanda ya fi digiri sifili amma kuma bai kai digiri casa'in ba($0^0<x<90^0$) shi ake kira da suna------?

a) lungu mikakke b) lungu mai tsini c) lungu mai fadi d) layi mikakke

13. Idan aka debe Nera dari daga cikin nere dari hudu nawa ne zai ragu ?

a) Nera dari biyu b) Nera dari uku c) Nera dari uku da hamsin d) Nera dari biyu.

14. Wani ma'auni ne duniyar ilimi ta yarda a gwada lokaci da shi ?

a) dakika b) Kwanaki c) karfe d) satikai

15. Ware bare daga cikin wadannan abubuwan da ake gwada lokaci da su.

a) Kwanaki b) watanni c) awoyi d) mita

16. Yanayin fara wane abu zuwa kammalawa shi ake kira da ----

a) tsawo b) kwana c) lokachi d) sati

17. Hekzagon yana da gefofi guda nawa ne ?

a) shida (b) biyu (c) uku (d) biyar

18. Wanne ne cikin wadannan misalai na shakali mai gefe hudu

a) murabba'i b) da'ira c) alwatika d) d) kusurwa

19. Kwanaki nawa ne suke daidai da sati guda ?

a) shida b) goma c) bakwai d) takwas

20. Ware bare dangane da abubuwan da ke kunshe a da'ira

a) marabin da'ira b) rabin marabin da'ira c) tsirkiya d) zati

MARKING SCHEME FOR MATHEMATICS RETENTION TEST 2(MRT2)

1. C
2. C
3. B
4. B
5. B
6. B
7. C
8. C
9. C
10. A
11. A
12. A
13. A
14. B
15. A
16. D
17. D
18. C
19. D
20. D

APPENDIX D

MATHEMATICS PERFORMANCE TEST 1(MPT_1)

SECTION A: BIODATA
Name of school----------
Class----------Identification No----------
Gender: Male [ ] Female [ ]
Age----------

SECTION B: ITEMS ON **MATHEMATICS PERFORMANCE TEST (MPT)**

Instructions:
Please read the following instructions carefully before you answer the questions.

1. Use HP Pencil provided for the examination.
2. Write your school name, class and identification number provided for the examination in the space provided in the answer sheet.
3. Read each question carefully before answering it.
4. After you have selected what you have chosen to be correct answer, go to your answer sheet and shade the appropriate alphabet in the space that corresponds with your choice.
5. Shade only one letter for each answer.

NOW ATTEMPT THE FOLLOWING QUESTIONS, SHADE THE CORRECT ANSWER IN TO ANSWER SHEET PROVIDED.

Q1. How many sides has a regular hexagon?

(a). 6 (b). 7 (c). 8 (d).9

Q2.Which of the following does not belong to a circle.

(a). Radius (b). Diameter (c). Height (d). Chord.

Q3. Multiply 6 and 5

(a). 30 (b). 11 (c).1 (d). 40

Q4. Find the arithmetic mean of 1,3,3 and 5.

(a). 4 (b). 3 (c).5 (d). 2

Q5. Add 6 to 11

(a). 12 (b). 17 (c). 18 (d). 5

Q6. Which of the following is not an example of a quadrilateral?

(a). Parallelogram (b). Square (c). Trapezium (d). Circle

Q7. A plane figure bounded by five sides is called a----------

(a). Pentagon (b). Hexagon (c). Square (d). Decagon

Q8. What is the S.I unit for measuring time?

a) Minute b) Second c) hour d) days

Q9. A Polygon is a plane figure bounded by----------

(a). Three or more sides b. More than four sides c. Less than four sides

(d). All of the above.

Q10. ---------- can be define as the duration of an event.

a) Length b) days c) weeks d) Time

Q11. Change 180 minutes to hours

(a). 2hrs (b). 4hrs (c). 3hrs (d). 5hrs

Q12. S.I unit stands for

a) Standard integrated unit b) system index unit c) standard international unit

d) standard internal unit

Q13. Find the perimeter of a square of length 5cm.

a) 12cm b) 14cm c) 20cm d) 8cm.

Q14. A Polygon bounded by eight side is called------

(a). octagon b. pentagon c. Hexagon d. decagon

Q15. A quadrilateral which has both pairs of opposite side parallel is known as------

(a). Rectangle (b). Rhombus(c). Kite (d). Parellogram

Q16. How many days are equivalent to one week

a) 2 b) 30 c) 7 d) 14

Q17. 67-24= ?

(a). 25 (b) 43 (c). 34 (d). 25

Q18. Find the median of the following numbers 3,1 and 5

(a). 3 (b). 4 (c). 6 (d). 9

Q19. A quadrilateral is a plane figure bounded by-------- sides

(a). Three (b). Five (c). Four (d). Six

Q20. Find the mode of the following numbers 1,5,2,2 ?

(a) 10 b) 1 c) 2 d) 5

MARKING SCHEME FOR MATHEMATICS PERFORMANCE TEST 1 (MPT_1)

1. A	11. C
2. C	12. C
3. A	13. C
4. B	14. A
5. B	15. D
6. D	16. C
7. A	17. B
8. B	18. A
9. A	19. C
10 D	20. C

APPENDIX E

MATHEMATICS PERFORMANCE TEST 2 (MPT_2)

SECTION A: BIODATA
Name of school----------
Class----------Identification No----------
Gender: Male [ ] Female [ ]
Age----------

SECTION B: ITEMS ON MATHEMATICS PERFORMANCE TEST 2(MPT_2)

Instruction
Please read the following instructions carefully before you answer the questions.

1. Use HP Pencil provided for the examination.
2. Write your school name, class and identification number provided for the examination in the space provided in the answer sheet.
3. Read each question carefully before answering it.
4. After you have selected what you have chosen to be correct answer, go to your answer sheet and shade the appropriate alphabet in the space that corresponds with your choice.
5. Shade only one letter for each answer.

NOW ATTEMPT THE FOLLOWING QUESTIONS, SHADE THE CORRECT ANSWER IN TO ANSWER SHEET PROVIDED.

Q1. Which of the following is not an example of a quadrilateral?
(a). Parallelogram (b). Square (c). Trapezium (d). Circle

Q2. Divide 25 oranges to five pupils, how many oranges each pupil will get ?
(a). 4 oranges (b). 6 oranges (c).5 oranges (d). 3 oranges

Q3.Find the mode of the following numbers 1,5,2,2 ?
(b) 10 b) 1 c) 2 d) 5

Q4. Find the median of the following numbers 3,1 and 5
(a). 3 (b). 4 (c). 6 (d). 9

Q5. A plane figure bounded by five sides is called a----------
(a). Pentagon (b). Hexagon (c). Square (d). Decagon

Q6. What is the standard international unit (S.I unit) for measuring time?
b) Minute b) Second c) hour d) days

Q7. A Polygon is a plane figure bounded by----------
(a). Three or more sides b. More than four sides c. Less than four sides
(d). All of the above.

Q8. ---------- can be define as the duration of an event.
b) Length b) days c) weeks d) Time

Q9. A quadrilateral which has both pairs of opposite side parallel is known as------
(a). Rectangle (b). Square (c).Trapezium (d). Parellogram

Q10. 12cm+ 15cm
a) 27cm b) 26cm c) 25cm d) 28cm

Q11. A quadrilateral, which has all its angles are right angles, is called a----------
(a). Rectangle (b). parallelogram (c). kite (d). Trapezium

Q12. S.I unit stands for
b) Standard integrated unit b) system index unit c) standard international unit
d) standard internal unit

Q13. How many sides has a regular hexagon?
(a). 6 (b). 7 (c). 8 (d).9

Q14.Which of the following does not belong to a circle.

(a). Radius (b). Diameter (c). Height (d). Chord.

Q15. Change 2 hours to minutes

a) 120minutes b) 60 minutes c) 180 minutes d) 45 minutes

Q16. Find the arithmetic mean of 1,3,3 and 5.

(a). 4 (b). 3 (c).5 (d). 2

Q17. Which of the following angles is an example of an obtuse.

a) 180^0 b) 80^0 c) 280^0 d) 160^0.

Q18. An angle that is exactly 180^0 is called ---------

(a) a right angle (b). an acute angle (c). a reflex angle (d). a straight line

Q19. Which of the following angles is an example of a reflex angle.

b) 180^0 b) 80^0 c) 280^0 d) 160^0.

Q20. How many days are equivalent to one week

b) 2 b) 30 c) 7 d) 14

MARKING SCHEME FOR MATHEMATICS PERFORMANCE TEST 2(MPT2)

1	C	11	A
2	C	12	C
3	C	13	A
4	A	14	C
5	A	15	A
6	B	16	B
7	A	17	D
8	D	18	D
9	D	19	C
10	A	20	C

APPENDIX F

MATHEMATICS RETENTION TEST 2(MRT2)

SECTION A: BIODATA
Name of school----------
Class----------Identification No----------
Gender: Male [ ] Female [ ]
Age----------
SECTION B: ITEMS ON **MATHEMATICS RETENTION TEST (MRT)**

Instruction
Please read the following instructions carefully before you answer the questions.

1. Use HP Pencil provided for the examination.
2. Write your school name, class and identification number provided for the examination in the space provided in the answer sheet.
3. Read each question carefully before answering it.
4. After you have selected what you have taken to be correct answer, go to your answer sheet and shade the appropriate alphabet in the space that corresponds with your choice.
5. Shade only one letter for each answer

NOW ATTEMPT THE FOLLOWING QUESTIONS, SHADE THE CORRECT ANSWER IN TO THE ANSWER SHEET PROVIDED.

Q1. Find the mode of the following numbers 1,5,2,2 .
(c) 10 b) 1 c) 2 d) 5

Q2. A quadrilateral, which has all its angles are right angles, is called a----------
(a). Rectangle (b). parallelogram (c). Rhombus (d). Trapezium

Q3. S.I unit stands for
c) Standard integrated unit b) system index unit c) standard international unit
d) standard internal unit

Q4. How many sides has a regular hexagon?
(a). 6 (b). 7 (c). 8 (d).9

Q5.Which of the following does not belong to a circle.
(a). Radius (b). Diameter (c). Height (d). Chord.

Q6. Change 3 hours to minutes
b) 120minutes b) 60 minutes c) 180 minutes d) 45 minutes

Q7. Which of the following angles is an example of a reflex angle.
a) 180^0 b) 80^0 c) 280^0 d) 160^0.

Q8. 24-14= ?

(a). 10 (b). 21 (c). 25 (d). 22

Q9. Which of the following is not among the properties of a square?
(a). All sides are equal (b). All angles are equal (c).Only the sides are equal
(d). All sides are parallel

Q10. Find the perimeter of a square of length 4cm.
c) 12cm b) 14cm c) 16cm d) 8cm.

Q11. Which of the following is not a unit for measuring time ?
(d) Kilometer b) days c) hours d) weeks

Q12. All of the following are the properties of parallelogram except.
(a). The four sides are equal (b). Opposite sides are parallel
(c). Opposite angles are equal (d). Diagnosis bisect one another

Q13. A plane figure bounded by five sides is called a----------
(a). Pentagon (b). Hexagon (c). Square (d). Decagon

Q14. What is the standard international unit (S.I unit) for measuring time?

c) Minute b) Second c) hour d) days

Q15. A Polygon is a plane figure bounded by----------

(a). Three or more sides b. More than four sides c. Less than four sides

(d). All of the above.

Q16. ---------- can be define as the duration of an event.

c) Length b) days c) weeks d) Time

Q17. Find the arithmetic mean of 1,3,3 and 5.

(a). 4 (b). 3 (c).5 (d). 2

Q18. Which of the following angles is an example of a reflex angle.

d) 180^0 b) 80^0 c) 280^0 d) 160^0.

Q19. An angle that is exactly 180^0 is called ---------

(b) a right angle (b). an acute angle (c). a reflex angle (d). a straight line

Q20. Which of the following is not an example of a quadrilateral?

(a). Parallelogram (b). Square (c). Trapezium (d). Circle

MARKING SCHEME FOR MATHEMATICS RETENTION TEST 2(MRT2)

1	C	11	A
2	A	12	A
3	C	13	A
4	A	14	B
5	C	15	A
6	C	16	D
7	C	17	D
8	A	18	C
9	C	19	D
10	C	20	D

APPENDIX G

TSARIN KOYARWA NA AMFANI DA AL'ADU DOMIN KOYAR DA LISSAFI (ETHNOMATHEMATICS LESSON PLAN)

DARASI NA DAYA (LESSON ONE)

Makaranta	Makarantar firamare na tunawa da Dabo Muh'd Lere,Lere.
Aji	Aji uku na firamare
Darasi	Lissafi
Batu:	Tarawa/Debewa/Rabawa da Rubanyawa.
Kwanan wata	Ashirin da Shida ga watan Satumba shekara ta dubu biyu da goma sha shida (26/09/2016).
Adadin yara	Yara dari da goma(110)
Shekaru	Shekaru goma sha hudu zuwa sha biyar(14-15years)
Jinsi	Maza da mata
Tsarin koyarwa	Na koyar da lissafi ta amfani da al'adu (Harshen Hausa)
Kayan aiki	Kananan duwatsu masu yawa
Abin da ake da burin	Bayan kammala wannan darasi ana sa ran daliban za su iya:
cimma wa	Na daya:
	Tarawa da debewa .
	Na biyu:
	Rabawa
	Na uku:
	Rubanya lambobi

Shudadden lokachi	Daliban sun san lambobi kwarori(units),gomanni(tens),daruruka(hundred)
Gabatarwa	Malami zai gabatar da darasin ta hanyar yi wa dalibai bayani kamar haka:
	Na farko:
	Lambobi kwarori su ne daga sifili zuwa tara(1 to 9)
	Na biyu:
	Lambobi gomanni su ne daga goma zuwa chasin da tara(1-99)
	Na uku :
	Lambobi daruruka su ne daga dari daya zuwa dari tara da casa'in da
Mata kan gabatarwa	tara(100-999)
	Malami zai gabatar da darasin ta wadannan matakai na gabatarwa kamar
Mataki na farko:	haka:
	Na farko: tara shida da biyar amsa:goma sha daya
Mataki na biyu :	(6+5=11)
	Na biyu: takwas a debe biyar
	Amsa:
	Za'a sami uku
Mataki na uku:	(8-5=3).
	Na uku : goma sha biyar araba ma mutane uku.
	Amsa :kowa zai sami biyar
Auna Fahimta	(15/3=5).
	Malami zai auna fahimtar yaran ta hanyar yin tambayoyi a kan abin da ya koyar da su .

Na daya: Tara shida da goma(6+10=16)

Takaitawa

Na biyu : Ashirin a debe takwas(20-8=12).

Malamin zai takaita darasin ta hanyar yi musu bayani tun daga farko,har zuwa karshe a takaice.

Kammalawa

Malam zai kammala darasinsa ta hanyar umurtan daliban da su kwashe rubutu daga allo zuwa littafinsu,sannan kuma ya ba su aikin da za su yi a gida.

DARASI NA BIYU(LESSON TWO)

Makaranta	Makarantar firamare na tunawa da Dabo Muh'd Lere,Lere.
Aji	Aji uku na firamare
Darasi	Lissafi
Batu:	Kididdiga(statistics)
Kwanan wata	Uku ga watan Oktoba shekara ta dubu biyu da goma sha shida (3/10/2016).
Adadin yara	Yara dari da goma(110)
Shekaru	Shekaru goma sha hudu zuwa sha biyar(14-15years)
Jinsi	Maza da mata
Tsarin koyarwa	Na koyar da lissafi ta amfani da al'adu (Harshen Hausa)
Kayan aiki	Masaki guda hudu(biyu girmansu daya,biyu kuma girmansu daban-daban)
Abin da ake da burin cimma wa	Bayan kammala wannan darasi ana sa ran daliban za su iya: Na daya: Kawo ma'anar matsakaicin kidaya(mean). Na biyu: Sanin ma'anar rabin jimillar aduda(median) Na uku: Sanin ma'anar marinjayi ko mafi yawan aukuwa(mode)
Shudadden lokachi	Daliban sun koyi tarawa,debewa,rabawa da kuma ribanyawa.
Gabatarwa	Malami zai gabatar da darasin ta hanyar yi wa dalibai bayani kamar haka:

	Na farko: tara shida da biyar amsa:goma sha daya (6+5=11) Na biyu: takwas a debe biyar Amsa: Za'a sami uku (8-5=3). Na uku : goma sha biyar araba ma mutane uku. Amsa :kowa zai sami biyar (15/3=5).
Mata kan gabatarwa	Malami zai gabatar da darasin ta wadannan matakai na gabatarwa kamar haka:
Mataki na farko:	Matsakaicin kidaya:shi ne matsakaicin da ake amfani da shi yau da kullum ,kuma ana kayyade shi ta cewa jimillar abubuwa ne da aka raba da adadin abubuwan.
Mataki na biyu :	Rabin jimillar aduda: idan abubuwan da ake rabawa daban an tsara su gwargwadon girmansu in an soma ko dai da mafi girma ko kuma da mafi karanci ,matsakaici ya kasance kimar haddin tsakiya.
Mataki na uku:	Marinjayi: shi ne abin da ya zama mafi yawan aukuwa ko kuma mafi kwarjini.
Auna Fahimta	Malami zai auna fahimtar yaran ta hanyar yin tambayoyi a kan abin da ya koyar da su.
Takaitawa	Malamin zai takaita darasin ta hanyar yi musu bayani tun daga

	farko,har zuwa karshe a takaice.
Kammalawa	Malam zai kammala darasinsa ta hanyar umurtan daliban da su kwashe rubutu daga allo zuwa littafinsu,sannan kuma ya ba su aikin da za su yi a gida.

DARASI NA UKU(LESSON THREE)

Makaranta	Makarantar firamare na tunawa da Dabo Muh'd Lere,Lere.
Aji	Aji uku na firamare
Darasi	Lissafi
Batu:	Kididdiga(statistics)
Kwanan wata	Goma ga watan Oktoba shekara ta dubu biyu da goma sha shida (20/07/2016)
Adadin yara	Yara dari da goma(110)
Shekaru	Shekaru goma sha hudu zuwa sha biyar(14-15years)
Jinsi	Maza da mata
Tsarin koyarwa	Na koyar da lissafi ta amfani da al'adu (Harshen Hausa)
Kayan aiki	Masaki guda hudu(biyu girmansu daya,biyu kuma girmansu daban-daban)
Abin da ake da burin cimma wa	Bayan kammala wannan darasi ana sa ran daliban za su iya: Na daya: Gano matsakaicin kidaya(mean). Na biyu: Gano rabin jimillar aduda(median) Na uku: Samo marinjayi ko mafi yawan aukuwa(mode)
Shudadden lokachi	Daliban sun san ma'anar, matsakaicin kidaya(mean), rabin jimillar aduda(median), mafi yawan aukuwa(mode).
Gabatarwa	Malami zai gabatar da darasin ta hanyar yi wa dalibai bayani kamar haka:

Na daya:

Matsakaicin kidaya:shi ne matsakaicin da ake amfani da shi yau da kullum ,kuma ana kayyade shi ta cewa jimillar abubuwa ne da aka raba da adadin abubuwan.

Na Biyu:

Rabin jimillar aduda: idan abubuwan da ake rabawa daban an tsara su gwargwadon girmansu in an soma ko dai da mafi girma ko kuma da mafi karanci ,matsakaici ya kasance kimar haddin tsakiya.

Na Uku:

Marinjayi: shi ne abin da ya zama mafi yawan aukuwa ko kuma mafi kwarjini.

Malami zai gabatar da darasin ta wadannan matakai na gabatarwa kamar haka:

Mata

kan Gabatarwa

MISALI:

Gano matsakaicin kidaya da rabin jimillar aduda da mafi yawan aukuwa daga cikin wadannan abubuwa hudu:1,3,2,1.

Mataki na farko:

Matsakaicin kidaya(m.k) $= \frac{1+3+2+2}{4} = \frac{8}{4} = 2$

M.k =2.

Idan aka jera lambobi daga karami zuwa babba za mu sami : 1,2,2,3.

Mataki na biyu :

Rabin jimillar aduda= (2+2)/2 = 4/2 =2 (tun da yake akwai adadi mara na haddodi)

Mafi aukuwa a cikin lambobin shi ne biyu =2 (saboda shi ne ya fi yawan fitowa).

Mataki na uku:

Auna Fahimta	Malami zai auna fahimtar yaran ta hanyar yin tambayoyi a kan abin da ya koyar da su kamar haka: Agano matsakaicin kidaya da rabin jimillar aduda da kuma mafi aukuwa na wadannan abubuwa guda biyar:1,3,3,2,4
Takaitawa	Malamin zai takaita darasin ta hanyar yi musu bayani tun daga farko,har zuwa karshe a takaice.
Kammalawa	Malami zai kammala darasinsa ta hanyar umurtan daliban da su kwashe rubutu daga allo zuwa littafinsu,sannan kuma ya ba su aikin da za su yi a gida.

DARASI NA HUDU(LESSON FOUR)

Makaranta	Makarantar firamare na tunawa da Dabo Muh'd Lere,Lere.
Aji	Aji uku na firamare
Darasi	Lissafi
Batu:	Gwaje-gwaje (Lokaci)
Kwanan wata	Sha bakwai ga watan Oktoba shekara ta dubu biyu da goma sha shida (17/10/2016).
Adadin yara	Yara dari da goma(110)
Shekaru	Shekaru goma sha hudu zuwa sha biyar(14-15years)
Jinsi	Maza da mata
Tsarin koyarwa	Na koyar da lissafi ta amfani da al'adu (Harshen Hausa)
Kayan aiki	Agogo mai lambobi (Kifta kato)
Abin da ake da burin cimma wa	Bayan kammala wannan darasi ana sa ran daliban za su iya: Na daya: Kawo ma'anar lokaci(time). Na biyu: Kawo misalai na abubuwan da ake gwada lokaci da su (sati,rana,wata d.s.s). Na uku: Chanja karfe zuwa minti(convert hour to minutes).
Shudadden lokachi	Daliban sun koyi tarawa,debewa,rabawa da kuma ribanyawa.
Gabatarwa	Malami zai gabatar da darasin ta hanyar yi wa dalibai bayani kamar haka:

	Na farko: tara karfe shida da karfe biyar amsa:goma sha daya = karfe goma sha daya. Na biyu: karfe takwas a debe karfe biyar Amsa: Za'a sami karfe uku (8-5)hrs=3hrs Na uku : Awoyi goma sha biyar araba su uku. Amsa :za'a sami awa biyar. (15/3)hrs=5hrs.
Mata kan gabatarwa	Malami zai gabatar da darasin ta wadannan matakai na gabatarwa kamar haka:
Mataki na farko:	Lokaci:shi ne yanayin fara wani abu zuwa kammalawa.
Mataki na biyu :	Za'a iya gwada lokaci da rana,wata,sati,awa(karfe),minti,dakika d.s.s.
Mataki na uku:	Awa daya yana daidai da mintuna sittin. Misali Chanja awa uku zuwa mintuna. Amsa Awa=minti sittin Awa uku = x Awa uku =uku sau sittin=dari da tamanin(3 x60minutes)=180minutes
Auna Fahimta	Malami zai auna fahimtar yaran ta hanyar yin tambayoyi a kan

abin da ya koyar da su kamar haka:

Takaitawa	Malamin zai takaita darasin ta hanyar yi musu bayani tun daga farko,har zuwa karshe a takaice.
Kammalawa	Malami zai kammala darasinsa ta hanyar umurtan daliban da su kwashe rubutu daga allo zuwa littafinsu,sannan kuma ya ba su aikin da za su yi a gida.

DARASI NA BIYAR(LESSON FIVE)

Makaranta	Makarantar firamare na tunawa da Dabo Muh'd Lere,Lere.
Aji	Aji uku na firamare
Darasi	Lissafi
Batu:	Jomatare(Geometry)
Kan batu	Lungu(Angle)
Kwanan wata	Ashirin da hudu ga watan Oktoba shekara ta dubu biyu da goma sha shida (24/10/2016).
Adadin yara	Yara dari da goma(110)
Shekaru	Shekaru goma sha hudu zuwa sha biyar(14-15years)
Jinsi	Maza da mata
Tsarin koyarwa	Na koyar da lissafi ta amfani da al'adu (Harshen Hausa)
Kayan koyarwa	Shakali mai nuna lunguna daban-daban da kuma Agogon bango (mai zagawa)
Abin da ake da burin cimma wa	Bayan kammala wannan darasi ana sa ran daliban za su iya: Na daya: Kawo ma'anar lungu(angle). Na biyu: Sanin lunguna daban-daban da misalansu: i. Lungu mai tsini(acute angle) ii. Lungu mikakke (right angle) Na uku: Sanin lunguna daban-daban da misalansu:

i. Layi mikakke

ii. Lungu budadde

Shudadden lokachi — Daliban sun iya amfani da agogon bango.

Gabatarwa — Malami zai gabatar da darasin ta hanyar yi wa dalibai bayani kamar haka:

Na farko: Lokacin da hannun agogo ya nuna karfe goma sha biyu dai-dai,dukkan hannayen suna guri daya to zamo iya kiranshi da dirja sifili.

Na biyu: lokacin da hannun agogon mai nuna alamar minti ya juya to za mu iya cewa wannan juyin daga gurinshi na farko zai samar da abin da ake kira da lungu wanda ake gwada shi da dirja.

Mata kan gabatarwa — Malami zai gabatar da darasin ta wadannan matakai na gabatarwa kamar haka:

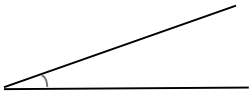
Mataki na farko: Lungu :shi ne ma'anarsa gwada yayanayin juyawa ko kuma zagayawa na abu.Ana gwada lungu ne da dirja.

Rabe-raben lungu:

Na daya : lungu mai tsini

.

Figure 4: Lungu mai tsini (Acute angle)



Mataki na biyu :

Mataki na uku:

Dukkannin wani lungu wanda ya ya fi dirja sifili kuma bai kai dirja casa'in ba shi ake kira da lungu mai tsini(acute angle).Misali dirja hamsin(50^0) ,dirja tamanin da tara(89^0)

Auna Fahimta

Na biyu : Lungu mikakke

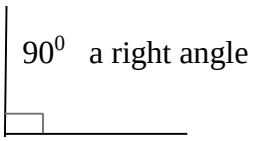
Lungu wanda yake da dirja casa'in dai-dai shi ake kira da lungu mikakke (right angle).Misali dirja casa'in (90^0) daidai.

Takaitawa

i) Lungu mikakke (a right angle)

Kammalawa

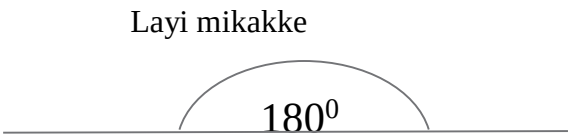
Figure 5:



Na uku : Layi mikakke

Lungu wanda yake da dirja dari da tamanin dai-dai shi ake kira da layi mikakke (straight line).Misali dirja dari da tamanin(180^0).

Figure 5:



Malami zai auna fahimtar yaran ta hanyar yin tambayoyi a kan abin da ya koyar da su.

Malamin zai takaita darasin ta hanyar yi musu bayani tun daga farko,har zuwa karshe a takaice.

Malam zai kammala darasinsa ta hanyar umurtan daliban da su kwashe rubutu daga allo zuwa littafinsu,sannan kuma ya ba su aikin da za su yi a gida.

DARASI NA SHIDA(LESSON SIX)

Makaranta	Makarantar firamare na tunawa da Dabo Muh'd Lere,Lere.
Aji	Aji uku na firamare
Darasi	Lissafi
Batu:	Jomatare(Geometry)
Kan batu	Lungu(Angle)
Kwanan wata	Talatin da daya ga watan Oktoba shekara ta dubu biyu da goma sha shida (31/10/2016).
Adadin yara	Yara dari da goma(110)
Shekaru	Shekaru goma sha hudu zuwa sha biyar(14-15years)
Jinsi	Maza da mata
Tsarin koyarwa	Na koyar da lissafi ta amfani da al'adu (Harshen Hausa)
Kayan koyarwa	Shakali mai nuna lunguna daban-daban da kuma Agogon bango (mai zagawa)
Abin da ake da burin cimma wa	Bayan kammala wannan darasi ana sa ran daliban za su iya: Na daya: Kawo ma'anar lungu mai fadi(obtuse angle). Na biyu: Kawo ma'anar lungu budadde(reflex angle) Kawo misalan lungu budadde daban-daban : Na uku: Kawo ma'anar da'ira(circle)

Shudadden lokachi	Daliban sun san ma'anar lungu mai tsini da misalansu,lungu mikakke da layi mikakke.
Gabatarwa	Malami zai gabatar da darasin ta hanyar yi wa dalibai bayani kamar haka:
	Na daya : Dukkannin wani lungu wanda ya ya fi dirja sifili kuma bai kai dirja casa'in ba shi ake kira da lungu mai tsini(acute angle).Misali dirja hamsin(50^0) ,dirja tamanin da tara(89^0)
	Na biyu : Lungu mikakke
	Lungu wanda yake da dirja casa'in dai-dai shi ake kira da lungu mikakke (right angle).Misali dirja casa'in (90^0) daidai.
	Na uku : Layi mikakke
	Lungu wanda yake da dirja dari da tamanin dai-dai shi ake kira da layi mikakke (straight line).Misali dirja dari da tamanin(180^0)
Mata kan gabatarwa	Malami zai gabatar da darasin ta wadannan matakai na gabatarwa kamar haka:
Mataki na farko:	Na daya : Lungu mai fadi
	Dukkannin wani lungu wanda ya ya fi dirja casa'in kuma bai kai dirja dari da tamanin ba shi ake kira da lungu mai fadi(obtuse angle).Misali dirja dari da hamsin(150^0) da kuma ,dirja dari da sittin da tara(169^0).
	Lungu mai fadi (obtuse angle) **Figure 5:**



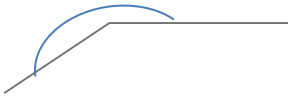
Mataki na biyu :

Na biyu :Lungu budadde

Dukkannin wani lungu wanda ya ya fi dirja dari da tamanin kuma bai kai dirja dari uku ba shi ake kira da lungu budadde(reflex angle).Misali dirja dari biyu da hamsin(250^0) da kuma ,dirja dari da tamanin da tara(189^0).

Lungu budadde (reflex angle)

Figure 7:



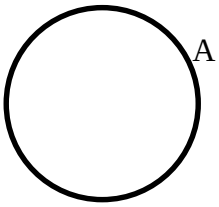
Mataki na uku:

Na uku : Da'ira

Lungu wanda yake da dirja dari uku da sitttin dai-dai shi ake kira da da'ira (circle).

A circle(360^0)

Figure 8:



Na uku : Misali

Misali dirja dari uku da sittin daidai (360^0) daidai.

Auna Fahimta

Malami zai auna fahimtar yaran ta hanyar yin tambayoyi a kan abin da ya koyar da su kamar haka:

Na daya: Me ake nufi da lungu budadde(obtuse angle).

Na biyu : Rarrabe wadannan lunguna dangane da yawan dirjarsu(mai tsini,mikakke, budadde da sauransu):dirja arba'in da biyar(45^0),dirja dari biyu da talatin da tara (239^0),dirja dari uku da sittin (360^0).

Takaitawa

Malamin zai takaita darasin ta hanyar yi musu bayani tun daga

	farko,har zuwa karshe a takaice.
Kammalawa	Malam zai kammalawa darasinsa ta hanyar umurtan daliban da su kwashe rubutu daga allo zuwa littafinsu,sannan kuma ya ba su aikin da za su yi a gida.

DARASI NA BAKWAI(LESSON SEVEN)

Makaranta	Makarantar firamare na tunawa da Dabo Muh'd Lere,Lere.
Aji	Aji uku na firamare
Darasi	Lissafi
Batu:	Jomatare(geometry)
Kan batu	Shakali mai gefofi da yawa(polygon).
Kwanan wata	Bakwai ga watan Nuwanba shekara ta dubu biyu da goma sha shida (7/11/2016).
Adadin yara	Yara dari da goma(110)
Shekaru	Shekaru goma sha hudu zuwa sha biyar(14-15years)
Jinsi	Maza da mata
Tsarin koyarwa	Na amfani da al'adu (Ta amfani da Harshen Hausa)
Kayan aiki	Shakali mai dauke da misalai na shakali masu gefofi da yawa
Abin da ake da burin cimma wa	Bayan kammala wannan darasi ana sa ran daliban za su iya: Na daya: Kawo ma'anar shakali mai gefofi da yawa. Na biyu: Kawo misalai na shakali masu gefofi da yawa. Na uku: Kawo ma'anar shakali mai gefe hudu da misalansa.
Shudadden lokachi	Daliban sun san alwatika, shakali mai gefe hudu masu tsawo daidai(square), shakali mai gefe hudu mai gefe biyu-biyu tsawonsu daya (rectangle).

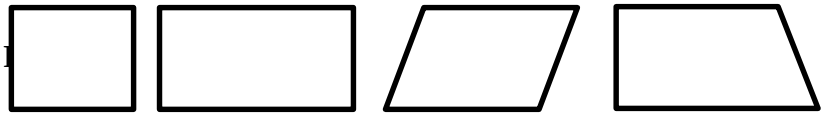
Gabatarwa	Malami zai gabatar da darasin ta hanyar yi wa dalibai bayani kamar haka: Shakali mai gefofi da yawa shi ne duk wani shakali mai gefe uku zuwa sama da uku.misali alwatika.shakali mai gefe hudu(quadralateral),shakali mai gefe biyar(pentagon).
Mata kan gabatarwa	Malami zai gabatar da darasin ta wadannan matakai na gabatarwa kamar haka:
Mataki na farko:	Na daya: Shakali mai gefofi da yawa shi ne duk wani shakali mai gefe uku zuwa sama da uku.misali alwatika.shakali mai gefe hudu(quadralateral),shakali mai gefe biyar(pentagon).
Mataki na biyu :	Na biyu:

Yawan gefofin shakali	Suna
Gefofi uku	alwatika
Gefofi hudu	shakali mai gefe hudu
Gefofi biyar	shakali mai gefe biyar
Gefofi shida	shakali mai gefe shida d.s

Mataki na uku:	Na daya: Dukkannin shakali mai gefofi hudu shi ake kira da shakali mai gefe hudu(quadralateral).

Figure 9:

A square A rectangle A parallelogram A trapezium



Na biyu:

Misalan shakali masu gefe hudu- hudu su ne:

i. Murabba'i (square)

ii. Shakali mai gefe hudu masu gefe biyu tsawonsu daya(Hatimi) (Rectangle).

iii. Shakali mai gefe hudu masu gefofi biyu tsawon su daya kuma shagidaddu(parallelogram).

iv. Shakali mai gefe hudu masu gefofi masu tsawo daban-daban(trapezium).

Auna Fahimta — Malami zai auna fahimtar yaran ta hanyar yin tambayoyi a kan abin da ya koyar da su.

Na daya: Kawo misalai na shakalai masu gefe hudu-hudu.

Takaitawa — Malamin zai takaita darasin ta hanyar yi musu bayani tun daga farko,har zuwa karshe a takaice.

Kammalawa — Malam zai kammala darasinsa ta hanyar umurtan daliban da su kwashe rubutu daga allo zuwa littafinsu,sannan kuma ya ba su aikin da za su yi a gida.

APPENDIX H

LESSONS PLAN FOR CONTROL GROUP (USING ENGLISH LANGUAGE)

Lesson One

Week	One
Date:	26/09/2016
Duration:	30 minutes
Class:	Primary III
Sex:	Mixed (Boys and Girls)
Average:	10 Years
Subject	Mathematics
Topic:	Number and numeration
Sub Topic:	Addition, subtraction, division and multiplication
Methodology:	Conventional method
Instructional Materials;	Chalk, Blackboard, Textbook
B/Objectives:	By the end of the lesson, the pupils should be able to:

i. Add and subtract numbers.

ii. Divide numbers

iii. Multiply numbers

Previous Knowledge: the pupils have learnt units, tens and hundredths

Introduction: the teacher introduces the lesson as follows:

Units are numbers from 0 to 9.Tenths are numbers from 10-99 and hundredths are numbers from 100-999

Presentation: the teacher presents the lesson through the following steps.

Step 1: 1. 6+5=11

Step II: 2. 8-5 =3

Step III: 3. 15/3 = 5

4. 10 x 3=30

Evaluation: The teacher evaluates the lesson by asking the pupils some questions based on what had been taught.

i. 6+10 =16

ii. 20-8 = 12

Conclusion: The teacher concludes the lesson by briefly explaining the main points of the lesson and allow the pupils to ask questions based on what has being taught in the class and copy note from the black board.

LESSON TWO

Week	Two
Date:	3/10/2016
Duration:	30 minutes
Class:	Primary III
Sex:	Mixed (Boys and Girls)
Average:	10 Years
Subject	Mathematics
Topic:	Statistics
Sub Topic:	Mean, Median and Mode
Methodology:	Conventional method
Instructional Materials;	Four containers out of them two are of the same size.
B/Objectives:	By the end of the lesson, the pupils should be able to: i. Define mean. ii. Define median iii. Define mode.
Previous Knowledge:	the pupils have learnt about addition, subtraction, division and multiplication.
Introduction:	the teacher introduces the lesson as follows: i. 6+5=11 ii. 8-5=3 iii. 15/3=5

iv. 10 x 4=40

Presentation: the teacher presents the lesson through the following steps.

Step 1: Arithmetic Mean: this is the average of every use, and is defined as the sum of the items divided by the number of items.

Step II: median: if the items of a dicrete distribution are arranged in order to size, in ascending or descending order,the median is the value of the middle term.

Step III: Mode: the mode of a discrete distribution is the most frequent ,or most popular item and the modal class is that with the greatest frequency.

Evaluation: The teacher evaluates the lesson by asking the pupils some questions based on what has been taught.

Summary: The teacher summarizes the lesson by explaining the main points to the pupils.

Conclusion: The teacher concludes the lesson by explaining the main points of the lesson and allow the pupils to ask questions based on what was taught in the class and copy notes from the black board.

LESSON THREE

Week	Three
Date:	10/10/2016
Duration:	30 minutes
Class:	Primary III
Sex:	Mixed (Boys and Girls)
Average:	10 Years
Subject	Mathematics
Topic:	Statistics
Sub Topic:	Mean, Median and Mode
Methodology:	Conventional method
Instructional Materials;	Four containers out of them two are of the same size.
B/Objectives:	By the end of the lesson, the pupils should be able to: iv. Calculate the mean. v. Find the median vi. Find the mode.
Previous Knowledge:	the pupils have learnt about the meaning of arithmetic mean, median and mode of a discrete distribution.
Introduction:	the teacher introduces the lesson as follows: 1. Arithmetic Mean: this is the average of every use, and is defined as the sum of the items divided by the number of items.

2. median: if the items of a dicrete distribution are arranged in order to size, in ascending or descending order,the median is the value of the middle term.
3. Mode: the mode of a discrete distribution is the most frequent ,or most popular item and the modal class is that with the greatest frequency.

Presentation: The teacher presents the lesson through the following steps:

Step i: Example:calculate the arithmetic mean,median and mode of the following :1,3,2,1

arithmetic mean(A.m)=(1+3+2+2)/4=8/4=2.

Step ii: when the numbers are arranged in ascending order we have:1,2,2,3

Median=(2+2)/2=2

Median=2

Step iii: mode=2 (because,2 appeared most).

Evaluation: The teacher evaluates the lesson by asking the pupils some questions based on what has been taught. For example,find the mean,median and mode of 1,3,3,2,4

Summary: The teacher summarizes the lesson by explaining the main points to the pupils.

Conclusion: The teacher concludes the lesson by explaining the main points of the lesson to the pupils and allow them to ask questions based on what was taught in the class and copy notes from the black board.

LESSON FOUR

Week	FOUR
Date:	17/10/2016
Duration:	30 minutes
Class:	Primary III
Sex:	Mixed (Boys and Girls)
Average:	10 Years
Subject	Mathematics
Topic:	Measurement
Sub Topic:	Measuring Time
Methodology:	Conventional method
Instructional Materials;	Chalk, Blackboard, Textbook
B/Objectives:	By the end of the lesson, the pupils should be able to:

i. Define time.

ii. Lists different units of measuring time.

iii. Convert hour to minute.

Previous Knowledge: the pupils have learnt about the meaning of measurement.

Introduction: the teacher introduces the lesson by making some talk about measurement.

Presentation: the teacher presents the lesson through the following steps.

Step I: **Time**: Time is the duration of an events..

Step II: Time can be measured in hours , minutes, seconds, days, weeks etc .The S.I unit for measuring time is seconds(S)

Step III: 1 hour = 60 minutes

1 minute = 60 seconds

Example 1: Convert 3hours into minutes.

Solution

1 hr = 60 minutes

3 hr = X minutes

By cross multiplication

1 x X =3 x 60 =180minutes

X = 180 minutes.

Evaluation: The teacher evaluates the lesson by asking the pupils some questions based on what has been taught.

i. Lists the three different units of measuring time.

ii. What is the S.I unit for measuring time?

Summary: The teacher summarizes the lesson by explaining the main points to the pupils.

Conclusion: The teacher concludes the lesson by briefly explaining the main points of the lesson and allows the pupils to ask questions based on what was taught in the class.

LESSON FIVE

Week Five

Date: 24/10/2016

Duration: 30 minutes

Class: Primary III

Sex: Mixed (Boys and Girls)

Average: 10 Years

Subject Mathematics

Topic: GEOMETRY

Sub Topic: Angle

Methodology: Conventional method

Instructional Materials; Chalk, Blackboard, Textbook

B/Objectives: By the end of the lesson, the pupils should be able to:

i. Define an angle.

ii. Lists different types of angles.

a. Acute angle

b. Right angle

c. Straight line

Previous Knowledge: the pupils have learnt about timing using wall clock.

Introduction: the teacher introduces the lesson by making some talk about the features of a wall clock and how it works.

Presentation: the teacher presents the lesson through the following steps:

Step 1: An angle can be defined as a measure of rotation. Degree is

the unit for measuring angle.

Different types of angle:

i. Acute angle: any angle that is greater than 0^0 but less than 90^0 is called an acute angle($0^0<X<90^0$).For example: 50^0 , 89^0

Step II: A right angle: this is an angle that is exactly 90^0 .

Step III: A straight line: this is an that is exactly 180^0

Evaluation: The teacher evaluates the lesson by asking the pupils some questions based on what has been taught.

Summary: The teacher summarizes the lesson by explaining the main points to the pupils.

Conclusion: The teacher concludes the lesson by briefly explaining the main points of the lesson and allows the pupils to ask questions based on what has being taught in the class.

LESSON SIX

Week Six

Date: 31/10/2016

Duration: 30 minutes

Class: Primary III

Sex: Mixed (Boys and Girls)

Average: 10 Years

Subject Mathematics

Topic: GEOMETRY

Sub Topic: Angle

Methodology: Conventional method

Instructional Materials; Chalk, Blackboard, Textbook

B/Objectives: By the end of the lesson, the pupils should be able to:

i. Define a obtuse angle.

ii. Lists different examples of a obtuse angle.

iii. Define a circle

Previous Knowledge: the pupils have learnt about an angle ,acute angle and a straight line.

Introduction: the teacher introduces the lesson as follows:

i. An angle can be defined as a measure of rotation. Degree is the unit for measuring angle.

Different types of angle:

i. Acute angle: any angle that is greater than 0^0 but less than 90^0 is called an acute angle($0^0<X<90^0$).For example: 50^0 , 89^0

ii. A right angle: this is an angle that is exactly 90^0 .

iii. A straight line: this is an that is exactly 180^0

Presentation: the teacher presents the lesson through the following steps:

Step 1: An obtuse angle is an angle that is greater than 180^0 but less than 360^0.

For example, angles 250^0 and 189^0.

Step II: A circle : this is an angle that is exactly 360^0 .

Step III: Example: $360^{0,}$ this is a complete circle.

Evaluation: The teacher evaluates the lesson by asking the pupils some questions based on what has been taught.

Summary: The teacher summarizes the lesson by explaining the main points to the pupils.

Conclusion: The teacher concludes the lesson by briefly explaining the main points of the lesson and allows the pupils to ask questions based on what has being taught in the class.

LESSSON SEVEN

Week	SEVEN
Date:	07/11/2016
Duration:	30 minutes
Class:	Primary III
Sex:	Mixed (Boys and Girls)
Average:	10 Years
Subject	Mathematics
Topic:	Geometry
Sub Topic:	Polygon
Methodology:	Conventional method
Instructional Materials;	Chalk, Blackboard, Textbook
B/Objectives:	By the end of the lesson, the pupils should be able to: i. Define a polygon ii. List different examples of a polygon iii. Define a quadrilateral and its example
Previous Knowledge:	the pupils have learnt about a the properties of a triangle, a square and a rectangle.
Introduction:	the teacher introduces the lesson by making some talk about the properties of a square, a rectangle and a triangle which actually refers to their characteristics .
Presentation:	the teacher presents the lesson through the following steps.

Step I: A polygon is any closed figure bounded by three or more straight lines.

Step II: Example of polygons :

	Polygon	Number of sides
i.	Triangle	3
ii.	Quadrilateral	4
iii.	Pentagon	5
iv.	Heptagon	7
v.	Octagon	8
vi.	Nonagon	9
vii.	Decagon	10

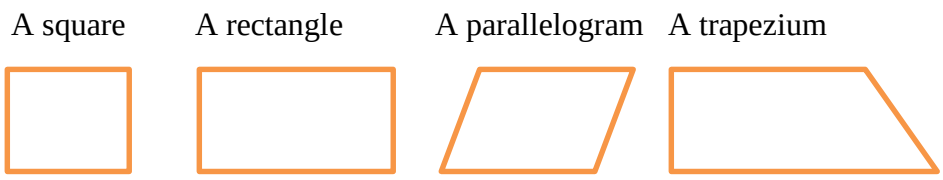
Step III:

i. A quadrilateral is any four sided polygon.

ii. Examples of a quadrilateral are:

A square, a rectangle, a parallelogram and a trapezium.

Figure 11:



Evaluation: The teacher evaluates the lesson by asking the pupils some questions based on what has been taught.

i. Lists three examples of a polygon

ii. Mention four examples of a quadrilateral.

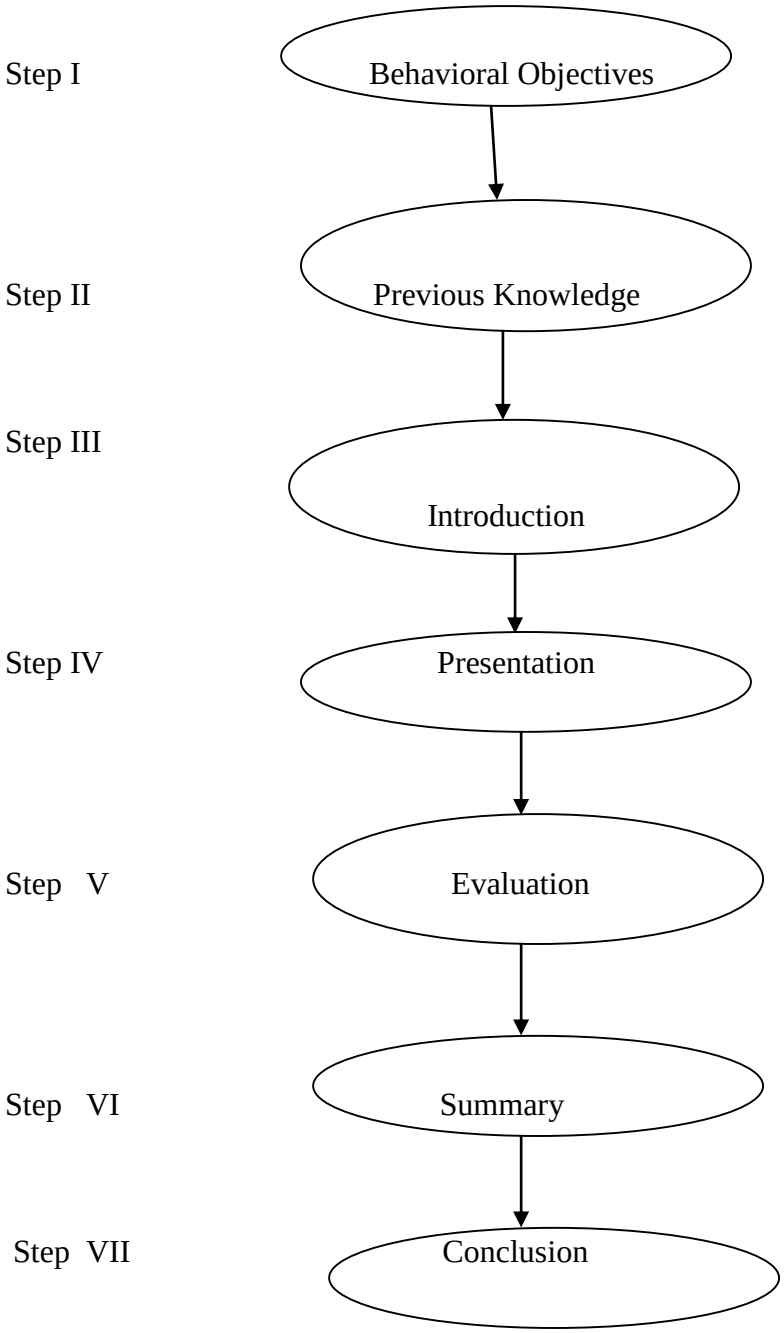
Summary: The teacher summarizes the lesson by explaining the main points to the

pupils.

Conclusion: The teacher concludes the lesson by briefly explaining the main points of the lesson and allows the pupils to ask questions based on what has being taught in the class and copy the note.

APPENDIX I

Figure 12: A flowchart adopted for the model for ethnomathematics teaching approach.



Source: Patrick , 2015.

Appendix J

A Manual for Teaching Using Ethnomathematics Teaching Approach

A Manual for teaching ethnomathematics teaching approach.Firstly, the manual for ethnomathematics teaching approach describes the necessary steps for using ethnomathematics teaching model (culturally relevant teaching model).The model has seven (7) phases that are behavioral objectives, previous knowledge, introduction, presentation, evaluation ,summary, and conclution. Secondly, a typical classroom application of the seven(7) phases model of the ethnomathematics teaching model was illustrated in table 10.Thirdly,figure 3 is a flowchart describing the procedure for teaching mathematics using ethnomathematics teaching model .While detailed steps for teaching mathematics using ethnomathematics teaching strategy was shown in appendix I, table 4.

1. Behavioral Objectives: these are the specific objectives that the teacher want to achieve at the end of the lesson.
2. Previous Knowledge: the pupils' knowledge of cultural artifacts will served as the previous Knowledge and the learning experience that have a link with the present lesson will be used as the previous knowledge.
3. Introduction: the teacher will introduce the lesson by explain the previous knowledge.
4. Presentation: the teacher will leads the class discussion by asking the pupils questions based on the topic to be taught and presents the lesson through various steps.
5. Evaluation: the teacher will evaluates the lesson by asking the pupils questions (orally) based on the lesson and the pupils will provide responses to questions asked by the teacher.

6. Summary: the teacher will summarizes the lesson based on the discussion and the pupils will write the summary note.
7. Conclusion : the teacher will concludes the lesson by asking the pupils to copy the note on their notebook and assignment will be given to them.

APPENDIX K

SCORES OF THE PILOT TESTING

S/N	MPT_1(pretest)	MPT_2(Posttest Scores)	MRT(Post-posttest Scores)	SEX
1	16	17	18	M
2	14	15	18	M
3	14	14	17	M
4	18	17	19	M
5	12	10	19	M
6	15	15	16	M
7	17	15	18	M
8	10	12	16	M
9	18	17	18	M
10	17	17	18	M
11	15	18	17	M
12	16	17	17	M
13	17	16	19	M
14	17	16	17	M
15	16	18	16	M
16	15	16	19	M
17	19	18	19	M
18	14	15	14	M
19	16	15	20	M
20	11	14	18	M
21	12	15	17	F
22	19	17	17	F
23	18	18	21	F
24	15	18	20	F
25	16	14	19	F
26	17	16	16	F
27	18	17	17	F
28	15	14	16	F
29	14	12	18	F
30	16	18	22	F
31	18	19	23	F
32	12	14	15	F
33	11	12	17	F
34	9	12	14	F
35	17	18	20	F
36	13	14	21	F
37	17	16	20	F
38	18	16	18	F
39	17	16	19	F
40	13	16	18	F

APPENDIX L

Analysis of Scores of the Pilot Testing for Reliability Test

```
RELIABILITY
  /VARIABLES=pretest posttest
  /SCALE('ALL VARIABLES') ALL

  /MODEL=SPLIT.
```

Notes

Output Created		17-May-2017 10:45:53
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	40
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=pretest posttest /SCALE('ALL VARIABLES') ALL /MODEL=SPLIT.
Resources	Processor Time	00:00:00.031
	Elapsed Time	00:00:00.016

Reliability Statistics

Cronbach's Alpha	Part 1	Value	1.000
		N of Items	1[a]
	Part 2	Value	1.000
		N of Items	1[b]
	Total N of Items		2
Correlation Between Forms			.805
Spearman-Brown Coefficient	Equal Length		.892
	Unequal Length		.892
Guttman Split-Half Coefficient			.887

a. The items are: pretest

b. The items are: posttest

Interpretation

From the result shown above, the split-half has the spearman-brown equal-length value of 0.892 which is significant at 0.05 level of significant.

Conclusion

The reliability of this test was assessed using the split-half method. The Spearman-brown equal-length value computed to be 0.89. The test is clearly reliable and has proven to provide consistent result.

APPENDIX M

PRETEST SCORES FOR EXPERIMENTAL GROUP DABO MUH'D MEMORIAL PRI.SCH LERE

S/NO	SCORES	SEX	S/NO	SCORES	SEX	S/NO	SCORES	SEX
1	18	M	43	18	M	85	18	F
2	17	M	44	17	M	86	18	F
3	17	M	45	19	M	87	19	F
4	18	M	46	19	M	88	19	F
5	18	M	47	17	M	89	17	F
6	15	M	48	18	M	90	9	F
7	16	M	49	16	M	91	18	F
8	13	M	50	9	M	92	17	F
9	14	M	51	12	M	93	13	F
10	17	M	52	18	M	94	18	F
11	19	M	53	17	M	95	12	F
12	19	M	54	18	M	96	16	F
13	12	M	55	17	M	97	18	F
14	17	M	56	19	M	98	12	F
15	18	M	57	18	M	99	18	F
16	15	M	58	12	M	100	17	F
17	19	M	59	9	M	101	18	F
18	14	M	60	19	M	102	17	F
19	19	M	61	17	F	103	19	F
20	14	M	62	18	F	104	18	F
21	11	M	63	18	F	105	12	F
22	13	M	64	19	F	106	9	F
23	18	M	65	18	F	107	19	F
24	19	M	66	17	F	108	19	F
25	17	M	67	18	F	109	17	F
26	18	M	68	16	F	110	18	F
27	19	M	69	16	F			
28	14	M	70	10	F			
29	19	M	71	12	F			
30	18	M	72	19	F			
31	16	M	73	18	F			
32	13	M	74	19	F			
33	11	M	75	18	F			
34	13	M	76	17	F			
35	18	M	77	18	F			
36	18	M	78	18	F			
37	19	M	79	15	F			
38	15	M	80	12	F			
39	12	M	81	17	F			
40	18	M	82	18	F			
41	17	M	83	17	F			
42	18	M	84	19	F			

APPENDIX N

PRETEST SCORES FOR CONTROL GROUP LGEA PRIMARY SCHOOL DAN'ALHAJI II

S/NO	SCORES	SEX	S/NO	SCORES	SEX	S/NO	SCORES	SEX
1	16	M	43	17	M	85	16	F
2	14	M	44	17	M	86	17	F
3	14	M	45	18	M	87	17	F
4	18	M	46	18	M	88	16	F
5	12	M	47	15	M	89	15	F
6	15	M	48	16	M	90	19	F
7	17	M	49	16	M	91	14	F
8	10	M	50	18	M	92	16	F
9	18	M	51	10	F	93	11	F
10	17	M	52	14	F	94	14	F
11	15	M	53	13	F	95	16	F
12	16	M	54	15	F	96	12	F
13	17	M	55	11	F	97	18	F
14	17	M	56	18	F			
15	16	M	57	16	F			
16	15	M	58	16	F			
17	19	M	59	14	F			
18	14	M	60	15	F			
19	16	M	61	16	F			
20	11	M	62	15	F			
21	12	M	63	18	F			
22	19	M	64	17	F			
23	18	M	65	14	F			
24	15	M	66	14	F			
25	16	M	67	18	F			
26	17	M	68	19	F			
27	18	M	69	16	F			
28	15	M	70	17	F			
29	14	M	71	10	F			
30	16	M	72	11	F			
31	18	M	73	18	F			
32	12	M	74	16	F			
33	11	M	75	13	F			
34	9	M	76	16	F			
35	17	M	77	18	F			
36	13	M	78	17	F			
37	17	M	79	11	F			
38	18	M	80	12	F			
39	10	M	81	15	F			
40	19	M	82	17	F			
41	15	M	83	18	F			
42	15	M	84	17	F			

APPENDIX O

POST -TEST SCORES FOR EXPERIMENTAL GROUP (DABO MUH'D MEMORIAL PRI.SCH LERE)

S/NO	SCORES	SEX	S/NO	SCORES	SEX	S/NO	SCORES	SEX
1	26	M	38	29	M	75	25	F
2	26	M	39	20	M	76	26	F
3	26	M	40	26	M	77	27	F
4	25	M	41	22	M	78	23	F
5	28	M	42	21	M	79	28	F
6	28	M	43	26	M	80	29	F
7	26	M	44	22	M	81	21	F
8	28	M	45	20	M	82	26	F
9	25	M	46	26	M	83	27	F
10	20	M	47	25	M	84	23	F
11	16	M	48	20	M	85	28	F
12	22	M	49	25	M	86	29	F
13	20	M	50	32	M	87	21	F
14	22	M	51	30	M	88	26	F
15	20	M	52	30	M	89	25	F
16	27	M	53	26	M	90	26	F
17	23	M	54	21	M	91	27	F
18	29	M	55	22	M	92	23	F
19	25	M	56	29	M	93	28	F
20	30	M	57	21	M	94	29	F
21	28	M	58	26	M	95	21	F
22	28	M	59	22	M	96	26	F
23	27	M	60	28	M	97	27	F
24	27	M	61	22	F	98	23	F
25	32	M	62	23	F	99	28	F
26	26	M	63	30	F	100	29	F
27	32	M	64	22	F	101	21	F
28	22	M	65	29	F	102	26	F
29	28	M	66	26	F	103	25	F
30	25	M	67	25	F	104	26	F
31	27	M	68	22	F	105	27	F
32	26	M	69	21	F	106	23	F
33	27	M	70	25	F	107	28	F
34	28	M	71	28	F	108	29	F
35	26	M	72	20	F	109	21	F
36	23	M	73	27	F	110	28	F
37	22	M	74	22	F			

APPENDIX P

POST-TEST SCORES FOR CONTROL GROUP LGEA PRIMARY SCHOOL LERE II

S/NO	SCORES	SEX	S/NO	SCORES	SEX	SEX	SCORES	SEX
1	10	M	45	22	M	89	16	F
2	20	M	46	21	M	90	16	F
3	14	M	47	19	M	91	18	F
4	15	M	48	12	M	92	20	F
5	10	M	49	20	M	93	28	F
6	15	M	50	12	M	94	24	F
7	15	M	51	28	F	95	13	F
8	12	M	52	13	F	96	18	F
9	17	M	53	12	F	97	16	F
10	17	M	54	24	F			
11	18	M	55	17	F			
12	12	M	56	18	F			
13	16	M	57	16	F			
14	16	M	58	18	F			
15	18	M	59	22	F			
16	20	M	60	12	F			
17	16	M	61	18	F			
18	20	M	62	26	F			
19	12	M	63	16	F			
20	15	M	64	18	F			
21	15	M	65	20	F			
22	17	M	66	18	F			
23	18	M	67	24	F			
24	23	M	68	23	F			
25	12	M	69	18	F			
26	14	M	70	16	F			
27	14	M	71	19	F			
28	18	M	72	11	F			
29	12	M	73	12	F			
30	18	M	74	16	F			
31	19	M	75	18	F			
32	14	M	76	22	F			
33	12	M	77	16	F			
34	25	M	78	23	F			
35	18	M	79	18	F			
36	17	M	80	17	F			
37	13	M	81	19	F			
38	16	M	82	12	F			
39	10	M	83	25	F			
40	20	M	84	17	F			
41	15	M	85	18	F			
42	20	M	86	17	F			
43	18	M	87	24	F			
44	14	M	88	18	F			

APPENDIX Q

RETENTION TEST SCORES FOR EXPERIMENTAL GROUP DABO MUH'D MEMORIAL PRI.SCH

S/NO	SCORES	SEX	S/NO	SCORES	SEX	S/NO	SCORES	SEX
1	22	M	46	26	M	91	26	F
2	25	M	47	20	M	92	20	F
3	23	M	48	25	M	93	25	F
4	24	M	49	22	M	94	22	F
5	27	M	50	23	M	95	23	F
6	26	M	51	28	M	96	28	F
7	22	M	52	25	M	97	25	F
8	26	M	53	22	M	98	22	F
9	24	M	54	23	M	99	23	F
10	18	M	55	22	M	100	22	F
11	16	M	56	16	M	101	16	F
12	20	M	57	30	M	102	30	F
13	22	M	58	20	M	103	20	F
14	21	M	59	28	M	104	28	F
15	29	M	60	27	M	105	27	F
16	25	M	61	20	F	106	20	F
17	22	M	62	20	F	107	20	F
18	21	M	63	25	F	108	25	F
19	26	M	64	22	F	109	22	F
20	22	M	65	21	F	110	21	F
21	28	M	66	28	F			
22	26	M	67	20	F			
23	25	M	68	26	F			
24	25	M	69	25	F			
25	21	M	70	20	F			
26	27	M	71	28	F			
27	20	M	72	30	F			
28	30	M	73	30	F			
29	21	M	74	25	F			
30	36	M	75	23	F			
31	28	M	76	23	F			
32	26	M	77	25	F			
33	25	M	78	27	F			
34	25	M	79	20	F			
35	24	M	80	26	F			
36	21	M	81	22	F			
37	20	M	82	25	F			
38	21	M	83	28	F			
39	25	M	84	26	F			
40	28	M	85	20	F			
41	22	M	86	20	F			
42	26	M	87	26	F			
43	28	M	88	18	F			
44	30	M	89	22	F			
45	25	M	90	26	F			

APPENDIX R

RETENTION LEVEL FOR CONTROL GROUP LGEA PRIMARY SCHOOL DAN'ALHAJI II

S/NO	SCORES	SEX	S/NO	SCORES	SEX	S/NO	SCORES	SEX
1	18	M	44	28	M	87	28	F
2	20	M	45	12	M	88	12	F
3	19	M	46	10	M	89	10	F
4	13	M	47	27	F	90	13	F
5	15	M	48	26	F	91	13	F
6	13	M	49	25	F	92	13	F
7	13	M	50	10	F	93	24	F
8	10	M	51	18	F	94	15	F
9	25	M	52	13	F	95	18	F
10	19	M	53	19	F	96	21	F
11	10	M	54	20	F	97	19	F
12	10	M	55	26	F			
13	15	M	56	16	F			
14	14	M	57	28	F			
15	15	M	58	26	F			
16	20	M	59	23	F			
17	15	M	60	20	F			
18	20	M	61	18	F			
19	21	M	62	19	F			
20	23	M	63	15	F			
21	16	M	64	22	F			
22	14	M	65	13	F			
23	16	M	66	26	F			
24	21	M	67	12	F			
25	11	M	68	26	F			
26	12	M	69	24	F			
27	10	M	70	19	F			
28	15	M	71	18	F			
29	10	M	72	15	F			
30	15	M	73	24	F			
31	28	M	74	18	F			
32	12	M	75	16	F			
33	10	M	76	18	F			
34	27	M	77	17	F			
35	26	M	78	10	F			
36	25	M	79	19	F			
37	10	M	80	23	F			
38	18	M	81	20	F			
39	13	M	82	15	F			
40	19	M	83	18	F			
41	23	M	84	29	F			
42	22	M	85	10	F			
43	10	M	86	28	F			

APPENDIX S

t-test Analysis of Post-Test Scores for the Experimental and Control Group

```
T-TEST GROUPS=GROUP (EXPERIMENTAL   CONTROL)
  /MISSING=ANALYSIS
  /VARIABLES=POSTTEST
  /CRITERIA=CI(.9500).
```

Notes

Output Created		18-May-2017 12:18:58
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	207
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.
Syntax		T-TEST GROUPS=GROUP(1 2) /MISSING=ANALYSIS /VARIABLES=POSTTEST /CRITERIA=CI(.9500).
Resources	Processor Time	00:00:00.016
	Elapsed Time	00:00:00.016

Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
POSTTEST	EXPERIMENTAL	110	25.2909	3.20649	.30573
	CONTROL	97	17.2577	4.02926	.40911

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
POST TEST	Equal variances assumed	2.287	.132	15.953	205	.000	8.03318	.50354	7.04040	9.02595
	Equal variances not assumed			15.729	182.919	.000	8.03318	.51072	7.02551	9.04085

APPENDIX U

t-Test Analysis of Post-Test Scores for Male and Female Pupils in the Experimental Group

```
T-TEST GROUPS=GROUP(MALE FEMALE)
  /MISSING=ANALYSIS
  /VARIABLES=POSTTEST

  /CRITERIA=CI(.9500).
```

Notes

Output Created		18-May-2017 12:43:16
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	207
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.
Syntax		T-TEST GROUPS=GROUP(1 2) /MISSING=ANALYSIS /VARIABLES=POSTTEST /CRITERIA=CI(.9500).
Resources	Processor Time	00:00:00.016
	Elapsed Time	00:00:00.016

Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
POSTTEST	MALE	60	25.2500	3.51570	.45388
	FEMALE	50	25.3400	2.82561	.39960

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
POST TEST	Equal variances assumed	1.605	.208	-.146	108	.884	-.09000	.61677	-1.31255	1.13255
	Equal variances not assumed			-.149	107.874	.882	-.09000	.60472	-1.28867	1.10867

APPENDIX V

t-Test Analysis for Post-test Scores for Male and Female Pupils in the Control Group

```
T-TEST GROUPS=GROUP(MALE FEMALE)
  /MISSING=ANALYSIS
  /VARIABLES=POSTTEST
  /CRITERIA=CI(.9500).
```

Notes

Output Created		18-May-2017 12:51:23
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	207
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.
Syntax		T-TEST GROUPS=GROUP(1 2) /MISSING=ANALYSIS /VARIABLES=POSTTEST /CRITERIA=CI(.9500).
Resources	Processor Time	00:00:00.016
	Elapsed Time	00:00:00.016

Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
POSTTEST	MALE	50	16.1200	3.52044	.49786

Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
POSTTEST	MALE	50	16.1200	3.52044	.49786
	FEMALE	47	18.4681	4.21618	.61499

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
POST TEST	Equal variances assumed	.462	.499	-2.984	95	.004	-2.34809	.78686	-3.91019	-.78598
	Equal variances not assumed			-2.968	89.830	.004	-2.34809	.79126	-3.92009	-.77608

APPENDIX W

t-Test Analysis of Post-Posttest Scores for Male and Female Pupils in the Experimental Group

```
T-TEST GROUPS=GROUP(MALE FEMALE)
  /MISSING=ANALYSIS
  /VARIABLES=POSTPOSTTEST
  /CRITERIA=CI(.9500).
```

Notes

Output Created		18-May-2017 12:57:49
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	207
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.
Syntax		T-TEST GROUPS=GROUP(1 2) /MISSING=ANALYSIS /VARIABLES=POSTPOSTTEST /CRITERIA=CI(.9500).
Resources	Processor Time	00:00:00.031
	Elapsed Time	00:00:00.016

Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
POSTPOSTTEST	MALE	60	24.1833	3.61959	.46729
	FEMALE	50	23.6400	3.37312	.47703

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
POSTPOSTTEST	Equal variances assumed	.006	.940	.808	108	.421	.54333	.67210	-.78888	1.87555
	Equal variances not assumed			.814	106.621	.418	.54333	.66777	-.78050	1.86716

APPENDIX X

t-test Analysis of Post-Posttest Scores for Male and Female Pupils in the Control Group

```
T-TEST GROUPS=GROUP(MALE FEMALE)
  /MISSING=ANALYSIS
  /VARIABLES=POSTPOSTTESTSCORES
  /CRITERIA=CI(.9500).
```

Notes

Output Created		18-May-2017 13:03:20
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	207
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.
Syntax		T-TEST GROUPS=GROUP(1 2) /MISSING=ANALYSIS /VARIABLES=POSTPOSTTESTSCORES /CRITERIA=CI(.9500).
Resources	Processor Time	00:00:00.016
	Elapsed Time	00:00:00.016

Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
POST -POSTTEST SCORES	MALE	50	16.9800	5.84665	.82684
	FEMALE	47	18.8723	5.26521	.76801

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
POSTPOSTTEST SCORES	Equal variances assumed	1.972	.163	-1.671	95	.098	-1.89234	1.13218	-4.14001	.35533
	Equal variances not assumed			-1.677	94.832	.097	-1.89234	1.12850	-4.13274	.34806