# EFFECTS OF METHODS OF TEACHING MATHEMATICS ON PERFORMANCE AND ANXIETY IN NIGER STATE PRIMARY SCHOOLS

**BY**

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## DECLARATION

I declare that this thesis entitled the "Effect of Methods of Teaching Mathematics Performance and Anxiety in Niger State Primary Schools" has been written by me in the Mathematics Education Section, Faculty of Education under the supervision of Prof. Y.K. Kajuru and Prof. C.A. Bolaji. The information derived from literatures was dully acknowledged in the text and a list of references provided.

…….  ……

***Baba Wachiko*** ***Sign Date***

## CERTIFICATION

This thesis entitled "Effect of Methods of Teaching Mathematics on Performance and Anxiety in Niger State Primary Schools" by Baba Wachiko meets the requirements governing the award of the Degree of Masters in Education (M.Ed) in Mathematics Education in Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literacy presentation.

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## DEDICATION

This work is dedicated to Allah Almighty who helped me and guided me throughout this programme. It is also dedicated to my mother, wife and children for their patience and moral support throughout the programme

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Glory be to Allah the most exalted and eternal, who provided health, knowledge, materials and power to those whom he likes and at the same time takes away all these from whom he likes through his mercy.

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## *ABSTRACT*

*This study examined the effect of teaching mathematics performance on anxiety in Niger State Primary Schools? The sample for the study consisted of two hundred and seventy (270) pupils randomly selected from six primary schools across the three educational zones of Niger State. The subject was divided into 2 groups of each 135 pupils as experimental and control groups. The experimental group used unified method that involve more of inquiry, demonstration, problem solving and group experiment strategies while the control used the conventional lecture method using the talk and chalkboard. A pretest was administered before the treatment to establish group equivalence. The subjects in the experimental group were then exposed to the treatment using the instrument design. Modified Mathematics Achievement Test (MAT) and Anxiety Mathematics Questionnaire (AMAQ) were adopted from Adamu (2005). The test was use to identify the gender effect on the treatment, while Analysis of variance (ANOVA) was used to analysis the effect of anxiety manifestation and symptoms on pupils achievement in mathematics. There was a significant different between the post test mean scores of the experimental and control groups in favour of the control group. That the male and female pupils are not differ significantly in the responses to anxiety related threats based on different teaching methods (inquiry, lecture, demonstration and problem solving). The study recommends effective instructional strategy that would reduce mathematics phobia and improve pupils' achievement in the subject.*

## LIST OF TABLES

**Pg**

## LIST OF APPENDICES

**pg**

## TABLE OF CONTENTS

**pg**

**CHAPTER TWO: Review of Related Literature**

**pg**

**CHAPTER THREE: Methodology**



**CHAPTER FOUR: Results and Discussion**



**CHAPTER FIVE: Summary, Conclusion and Recommendation**

**Operational Definition of Terms**

(i) **Anxiety:** A state of unstable, emotional and psychological maladjustment leading to confusion, fear, panic and restlessness.

(ii) **Achievement:** Measurement of how well or bad an individual tries to accomplish set objectives.

# CHAPTER ONE

# THE PROBLEM

## 1.1 Introduction

The role of science and technology in the modern world cannot be over-emphasized. Science and technology has become critical factors of economic and social development. The classification of countries according to their economic position reflects the state of their scientific and technological development. Learning science requires the learner to have certain abilities in using mathematics. It is not only used by scientists but by bankers, architects, market women, tailors, surveyors to mention but a few. Due to the importance of mathematics to the society, the teaching of the subject was made compulsory from primary to tertiary level in Nigeria. This is reflected in the National Policy on Education (FME, 2004) where it states that "teaching mathematics is compulsory at both primary schools levels.

Mathematics was made a core subject of science curricular, yet students performance in the subject continue to worsens as years go by (Segun, 2001 and Hussaini, 2003). An appraisal of pupils' achievement at common entrance and other local examinations revealed a sympathetic situation of poor performance in science and mathematics in particular (Nathaniel, 2005). Also, the picture emerging from research findings/reports shows that pupils have difficulties in solving mathematical problems.

Obodo (1991) stated that the nature of mathematics demands a lot of thinking and time from pupils. These thinking processes are in three levels i.e. critical, postulation and analytical thinking all requires considerable energy and patience.

Attempt by government and other stakeholders in education to regenerate pupils' interest towards mathematics ended up in the introduction and adoption of new pedagogies and employment of more teachers. The problem of persistent failure in mathematics remained a nightmare. Research findings by Bayo (2004) and Segun (2006) show that 52% of failure recorded in mathematics is traced to anxiety related factors.

Anxiety is an unpleasant, complex and varied pattern of behaviour which individuals show when reacting to internal and external stimuli. It is a psychological construct that is inferred from verbal reports, physiological indicator, general behaviour or combinations of some of these factors. Shadow (2002) identified some of the symptoms of anxiety to include nervousness, restlessness, heart pounding, panic, trembling and feeling that familiar things are strange. Several studies have identified anxiety as one of the most serious problems impending pupils' performance in science, mathematics and technology especially during external examinations (Segun, 2006; Hussaini, 2003 and Ken, 2005). Anxiety is a state of confusion, disorder and usually cause as a result of over-reaction of some body hormones. This psychological disorder often resulted into high blood pressure, stress and memory failure. It is deduced that pupils' poor performance in mathematics may be attributed to their high anxiety level during and after classroom instructions. Segun (2006) stated that anxiety as factors that determine what pupils can do and to what extent. Also, teaching methods and availability of instructional materials had significance impact on how much learners can acquire in mathematics. Clearly, the researcher is prompted to carryout this research

after reading this study by (Ken 2005, Gana 2006. The finding on these methods had proved to reduce anxiety and phobia among pupils and enhance performance (Ken, 2005 and Gana, 2006). This study therefore examined the effect of method of teaching mathematics performance and in Niger State Primary Schools.

## 1.2 Statement of the Problem

Mathematics has been said to be one of the most important subjects in our educational system. This is one of the reasons why it is made compulsory at the primary and secondary school levels. However, evidences from research findings revealed unpleasant pupils' performance in the subject (Hussaini, 2003 and Ken, 2005) of all the factors identified as hindering pupils achievement in the subject, anxiety related factors accounted for over 52% of the failure. Anxiety is a state of psychological disorder leading to substantial confusion and memory failure.

Anxiety has been seen through research studies to have accounted for the underachievement in mathematics especially at primary school level. Teachers and parents have attempted to remove this canker worm through improvisation and the use of appropriate teaching technique. Yet, a decline in pupils' performance is witnessed across the country over the years. For any meaningful learning to take place the mind and the entire body must be physically ready and spiritually prepared. Anxiety posses a threat to school children especially during and after mathematics instruction.

This study sought to examine factors that might create confusion, disorderliness, panicking, and their consequent effect on pupils understanding of mathematical concept. Research finding by (Adam, 1999 & Eze, 2003) revealed that anxiety posses a

threat to a positive character manifestation and acquisition of knowledge either on individual bases or group. Anxiety is seen to have negative impact on attention and poor attention resulted to low assimilation, hence decline achievement. This present study is designed to assess and investigate the effect of methods of teaching mathematics performance and anxiety on pupil's achievement.

## 1.3 Objective of the Study

This research work on the effect of methods of teaching mathematics on anxiety in Niger State Primary Schools was conceived to achieve the following objectives.

(i) To examine the effect of unified mathematics teaching methods and anxiety in Niger State Primary Schools.

(ii) To establish gender related influence on pupils' achievement in mathematics using unified methods of teaching.

(iii) To determine the effect of unified teaching methods and anxiety manifestation on pupils achievement in mathematics.

## 1.4 Research Questions

(i) To what extend do mathematics teaching methods trigger anxiety among primary school pupils in Niger State?

(ii) Do male and female pupils differ in their responses to mathematics anxiety related threats arising from unified teaching methods?

(iii) What signs and behavioural manifestation exhibited by pupils with anxiety as a result of different teaching methods?

## 1.5 Research Hypotheses

To guide this study, three research hypotheses were formulated in null form and tested at 0.05 level of significance.

1. **$H0_1$:** There is no significant difference in effect of methods of teaching mathematics performance on anxiety of primary school pupils.

2. **$H0_2$:** There is no significant difference in teaching methods between the mean scores of male and female pupils on anxiety.

3. **$H0_3$:** There is no sinificant relationship in methods of teaching mathematics and symptoms of anxiety of primary school pupils.

## 1.6 Significance of the Study

A research in this field and related areas might be helpful to pupils, parents, teachers, psychologists, publishers, curriculum planners and examination bodies in the following areas.

**Pupils:** The findings from this study has provided database information that will guide mathematics pupils conduct before, during and after classroom instruction. It will assist them in problem solving skill development, thereby broadening their horizon for wider applicability of some mathematical concepts or phenomena. Pupils will become acquainted with variety of teaching methods such as lecture, inquiry demonstration, drill and practice, roleplay, dramatization.

**Parent/Teachers**: The findings from this research will enlighten parents on the role of parental support in child upbringing and learning in school, while teachers will be better equipped with necessary skills appropriate for effective mathematics instruction. Abstracts concepts can now be meaningfully, taught by mathematics teacher using

concrete objects found within the learners' environment. Parents can access the performance of their wards with ease and choose appropriate learning strategy for them.

**Psychologists**: Study of this nature might serve as an eye-opener for councilors, psychologist and matron by providing conceptional framework while the discussing or interviewing pupils in other to provide appropriate working. Appropriate references can be made to some learning theories as they affects classroom instruction and counseling activities. School guidance counselor will use the findings of these study to develop masterpiece for school counseling programme.

Finally, publishers, examination bodies (WAEC, NECO, NTI etc) and curriculum planners will be better equipped while citing examples or making illustration on some abstract mathematical concepts. Pupils will be guided and better educated on examination ethics, the role of continuous assessment and appropriate use of instructional teaching materials that guarantee coherent learning and assimilation by pupils. The use of graphics can simplify topics and the choice of teaching methods for some concepts.

## 1.7 Scope and Delimitation of the Study

The study is supposed to cover all three educational zones of Niger State, but due to the time constraints and money, the study was limited to only selected schools in the three educational zones in Niger State. The study drawn its sample from the primary six in all the school selected. The study was limited to government owned and funded coeducation primary school across thee educational zones of the state.

As per the content on the other hand, the research work focus on unified teaching methods in mathematics and its effects on anxiety. Thus, the study do not concern about anxiety management among school children. However, four teaching methods (i.e. inquiry, demonstration, lecture and problem solving) were adequately treated by this study.

# CHAPTER TWO

# REVIEW OF RELATED LITERATURE

## 2.00 Introduction

This chapter reviewed related literature covering the following area/topics: Concept of Anxiety, mathematics instruction and anxiety management, characteristics and behavioural manifestation of anxiety, consequences of anxiety on pupils' performance in mathematics, devastating effects of anxiety among the male and female pupils' in primary school, diagnosing pupils' learning difficulties arising from anxiety among others.

## 2.01 Concept of Anxiety

Anxiety is defined as the emotional condition in which there is fear and uncertainty about the future. Thus anxiety is the quality or state of being anxious, uneasiness or trouble of mind about some particular event. Anxiety according to Deji, (2004) has been described as the proneness to emit self-centered interfering responses when confronted with an evaluative task. Adamu (2005), defined anxiety as a pattern of psychological and physiological stress which is avoided or minimized. Also, in a related development Okeke (2001) believes that anxiety is the most common reaction to the stress of crises; he further explained that anxiety is the feeling of fear and apprehension just before embarking on a difficult task. Okebukola (1982) in his narrow definition states, "anxiety is a pervasive emotion experienced frequently by pupils in the classroom." Adamu (2005), in his definition of anxiety, observe that anxiety is the proneness to produce an interfering response when confronted with a difficult task.

From the above, the definition of anxiety varies with the feathers emphasized depending on the writer's perspective. Important to the study of mathematics, anxiety involves both cognitive and non cognitive aspects, that is both beliefs and feelings about the object of anxiety. Anxiety can thus be seen as internal, private emotions whose existence can be inferred from some form of behavioural evidence when such behaviour are expressed overtly in words or deed. A student's overall mathematics anxiety is, for example, a composite of his intellectual appreciation of mathematics and his emotional reaction to it.

Those who suffer from mathematics anxiety report a range of emotional responses when confronted with numbers: increased heart rate, increased perspiration, a feeling of light-headedness and dry mouth, a mind that "goes blank" etc. In short mathematics anxiety is not some hysteria, or tactics used to get out of doing school work, mathematics anxiety is a real physiological response set off by the thought of doing mathematics. Individuals with this anxiety become extremely nervous and go to great lengths to get away from the sources of their fear. These persons learn about mathematics under duress, which further increases their anxiety, and may immediately forget whatsoever facts they were forced to learn.

The concept of anxiety offers an example of how patterns of behaviour can range from those anxiety moments before an individual goes into problem solving state, to those manifested in degrees. At one end it may just prevent the individual from performing to his full capacity and at the other end it may evolve panic. In a severe state of anxiety, the individual enters a state of stress because of some internal conflict

which he has been unable to resolve. Two types of anxiety were identified by Spielberger (1972). Traits anxiety and state anxiety. Traits anxiety, according to him is relatively enduring individual differences in their proneness to anxiety, while state anxiety is a transitory emotional state having temporal dimension and varies in intensity. The two however interact, in that evaluative task are most threatening to persons with high anxiety traits and therefore react with high anxiety state.

Although, anxiety involves fear and feelings of depressions which is freely generated within the individual. It is sometimes caused by situations of high predictability or those where the individuals are faced with puzzling or frustrating circumstance. At times anxiety can be caused by the individual's imagination. For example, an anticipated punishment can cause anxiety. In the case of test anxiety, the fear of failure (which is the punishment) is anxiety producing. There is also some evidence to support the theory that extreme degrees of anxiety is related to high concentration of lactic acid in the blood system (Tole, 2006).

## 2.02 Mathematics Teaching Methods in Nigerian Primary Schools.

Many educators considered mathematics as the queen of science and technology needed for economic and political growth. It is in respect of this, that the subject is made compulsory at all levels of education. Research findings by (Abdullahi, 1998 and Kolawale 2007) revealed that the method adopted by some mathematics teachers in the manipulation of numbers and subsequent interpretation for decision making especially at the primary school level had made many people to hate the subject.

Beside the inconsistencies in the application of abstract terms and symbols had worsen the situation, thereby leading to under achievement in the subject.

Too often, under-achievement in mathematics has been blame on incompetent teacher who uses little resources, poor methods and unacceptable instructional strategy to impact knowledge. Examples of teaching methods used to teach mathematics include the lecture, demonstration, project, guided discovery and role play. Hussaini (2003) opined that if a child does not reach a satisfying understanding of the basic concepts in mathematics taught at primary, there is little chance that he will achieve in the more advanced areas of the subject. He observed that some methods are more appropriate for a group of learner than other. Therefore, is suggested that mathematics teacher are to think seriously on the teaching methods that could enable the pupils to achieve the objective. Hussaini (2003) further stated the following factors that will enable the teacher to select the best methods of teaching a particular class.

i. Pupils age and their backgrounds or previous experiences in the topic to be taught.
ii. The ability of the mathematics teacher to handle the chosen methods.
iii. The nature of the topic to be taught.
iv. The size of the class.
v. The resources and facilities at the teachers disposal.
vi. The period of the day a particular lesson is supposed to be taught.

However, teaching method is defined as group of related experience and activities arranged for individual or group of individual to specifically produce certain

changes in terms of knowledge, understanding, habit, skills, attitude in the behavior of the learner Kolawale (2007). In Nigeria, teaching methods adapted by mathematics teachers are considered to be effective by their users, but has not cause desire change in pupils behavior over the years. The major complain by the pupils is the abstract nature of some mathematical concepts. Kolawale (2007) suggested some new teaching strategies that will boost performance in mathematics include:

**Problem solving:** This is a strategy that requires the learners discover high-order rule without specific assistance. Presumably, pupils contact new rule in their idiosyncratic manner and may not be able to verbalize it once constructed (Kolawale 2007). A problem solver is one who uses it initiative and skills with little assistance in design way(s) by solution to a given problem is generated. The advantages of problem-solving technique is learner centeredness, require little instructional materials, and cost effectiveness. The problem solver will have to think of what he/she needs to solve the problem. He/she may have to look at his/her past experiences, do some translations, analysis, synthesis and evaluation. If the solver has a ready-made answer, then it is not a problem. If the skill needed are easily gotten. Then it is an exercise i.e. it looks like a previously solved problem.

Problem solving therefore, can be described as finding an appropriate response to a situation that is unique and novel to the problem solver. It is therefore, important for you as a teacher to know how to go about solving a problem. This will enable you to put your pupils through when you want to use this approach to communicate with

your pupils. In mathematics, most of the time, the pupils will be expected to solve one problem or the other. Other importance of problem solving approach are as follows:

1. The process of solving problem leads to the learning of new ideas or concepts;
2. It is a very meaningful way of practicing computational skills.
3. It allows for transfer of skills and concepts;
4. It stimulate intellectual curiosity; and
5. It leads to the discovery of new knowledge.
6. Problem solving is a major focus of mathematics learning.

Bala (2001) listed the following steps:

1. The problem solver must first know exactly what the problem is all about. In this case, he/she is expected to re-read the statement of the problem; know exactly the information given in the problem. He/she must re-state the problem in his/her own way for clarity and more understanding of what is expected.
2. The problem solver now relates the problem to a familiar idea or a previously solved problem. In this case he/she searches his/her mind to see if he/she has come across a similar problem before.

   If the problem looks to be a familiar, the solver then searches for the required tools such as a theorem, a rule, a principle (formula) or concepts in Mathematics which could be used to solve the problem. This is a process of matching old ideas with a new situation.

3. The problem solver must then search for a strategy based on the structure he/she must have discovered in (2) above. The facts given in the problem are analyzed in order to find if t here is a pattern. This is a search stage.
4. The problem solver will then at this stage use the pattern found in (3) to get a complete solution to the problem.
5. The problem solver should at t his step attempt to generalize his result so that it can be applied to a similar problem in the future.
6. The problem solver should then analyzed the method he/she has used in solving the problem and find an alternative way of getting the solution to the problem.

**Guided discovery:** This method allows mutual working relationship between the mathematic teacher and the learner, the teacher guide the pupils by explaining the basic concepts and allow his/her pupils to continue. Learners may seek clarification on difficult terms as they progress. Also, learners are made to observe carefully, ask questions, measures, classify, predicts and communicate their findings. This approach in maths and science teaching was postulated by Bruner (1961). The approach enables pupils to get first hand experience in getting facts, concepts and principles and processes by using mental process and manipulating scientific equipment and material. Brunner believes that a child who is exposed to the guided discoveries gets four (4) benefits. These are:

i. There will be increase in intellectual attainment
ii. There is shift from extrinsic to intrinsic motivation.

iii. The learning of the discoveries is valuable to student's investigation processes.

iv. Discovery learning aid memory of the child.

Olagbewo, (2003) sees it as mental assimilation by which the individual grasp a concept or principle resulting from physical and mental activity. In this method, the teacher ensures that the students have a chance to form concepts by studying objects before leading the students to form the generalization. In guided discovery method of teaching concept formation is the main purpose.

Guided discovery method has the following steps (Falcon, 2003):

- the teacher describes the performance expected of the students after they have learned the concept.
- The teacher provides positive and simpler concepts or attributes.
- The teacher provides positive and negative examples in close succession or simultaneously
- The teacher assesses the learning of the students

Guided discovery methods is applicable to virtually all areas of teaching. The types of activities students are involved is vary from topic to topic and with the age and ability of the students. The amount of guidance the students receive from the teacher also vary but are never excessive. Guided discovery is a method of teaching that involves mental skills for learning by students to observing, measuring, classifying and so forth (James 2004, Tsado, 2005).

**Inquiry:** This is an investigation approach to solving mathematical problem. The learner is given all resources and support to find out by themselves or provides specific answer to the question raise. Inquiry method is a scientific way of generating solution set to a given problem thereby increasing learner's understanding and familiarity of the learned topics. The procedure for getting basic solution is systematically outlines. The nation of mathematical inquiry, or inquiry based mathematics, is not simple nor uncontested. Problem solving and investigation were presented as discrete teaching approaches that could be used to foster and encourage the construction of mathematical knowledge and higher order thinking skills. However, inquiring were also to be encouraged and supported. The aim was to overcome the "brittle" performances resulting from pedagogies of old and to engage pupils "with a desire to explore the world in mathematically interesting and coherent ways and make sense out of complex situations, whether in th e 'real world' or the world of mathematical structures Hussaini (2003)".

**Demonstration:** This is a method that involves class activities to demonstrate the abstract concepts or ideas. It can be carried out by teacher alone or the teacher with a pupil or the child who is knowledgeable in the activity. Kolawale further stressed that the following could be noted when carrying out demonstration method:

- Purpose of the demonstration must be clearly specified.
- Demonstration should be visible to all pupils.
- Involve the pupils as much as possible.
- Use simple and readily available material for demonstration.

## 2.03 Signs and Symptoms of anxiety among Primary School Pupils

The construct of 'mathematics anxiety' has received considerable attention among researchers and mathematics educators in recent years. Most previous studies of mathematics anxiety have focused on high school students or adults, while mathematics may also provoke strong and adverse reactions in children (Adam 2005). Ages 9 to 11 seems to a critical stage for the development of attitudes and emotional reactions towards mathematics (Hussaini 2003). In addition, childhood, being a period of rapid change, may be a time when anxiety is especially evident. Although attitudes may deepen or change throughout schools, generally, negative attitudes and anxiety are difficult to change and may persist into adult life, with far-reaching consequences.

Some of these consequences include avoidance of mathematics (Ken 2005), distress (Nwosu, 2000) and interference with conceptual thinking and memory processes (Segun, 2006). Some researchers expand the concept of mathematics anxiety to include both facilitative and debilitative anxiety. Deji (2004), for example, claim that the negative affective reactions component of mathematics anxiety may be debilitating while the cognitive component might actually have some positive motivational consequences for the amount of effort pupils put into mathematics and thus for mathematics performance. Depending on the individual and the task, a moderate amount of anxiety may thus actually facilitate performance. Beyond a certain point, however, anxiety becomes debilitating in terms of performance, particularly in the case of higher mental activities and conceptual processes (Davis, 1999). Thus, although mathematics anxiety may in some cases have positive effects, it is perhaps

more important for educationalists to focus on its possible negative consequences for performance.

It is generally agreed that anxiety is characterized by

- State of confusion and feeling tense
- Sudden rise in blood pressure leading to abnormal behaviours
- Poor performance at home, school or workplace as a result of instability
- Internal stress and uncertainties

It is clear from the above, that anxiety is an unpleasant, complex and varied pattern of behaviour which an individual display

when reacting to usual stimuli. This means that anxiety-related problems has negative consequences in the life style and learning experience of an individual.

Research findings by (Bala, 2001; Gana 2006 and Ladoke, 2006) revealed a devastating effect of anxiety on school children. In their studies, 10 pupils were chosen from primary six. The pupils are from different family background and economic status. Five of the selected pupils were from poor family, broken homes, rural dweller and chaotic parental-hood. The other five pupils were from elite class and had proper up-bring. These pupils (A & B) were exposed to two weeks instruction and a week revision.

A test was administered on them and their performance were scored and graded. The breakdown of the result is given below:

| | English Language | | Mathematics | |
|---|---|---|---|---|
| Category | Before | After ($\overline{x}$) | Before | After ($\overline{x}$) |
| Group A | 48.50 | 37.64 | 49.20 | 22.60 |

| | | | | |
|---|---|---|---|---|
| Group B | 49.00 | 52.40 | 49.00 | 53.40 |

An examination of the table above show Group A is a category of pupils with anxiety-related problems hence the performance before treated was 48.50 and 49.20 for English and Mathematics respectively. A decline in performance was notice after the treatment i.e. 37.64 and 22.60 for English and Mathematics respectively. This drop was more pronounced in mathematics because of the mental skills requirement in solving mathematical problems. However, group B, there was an improvement in pupils performance in both subjects after the treatment.

Anxiety could manifest in pupils as result of the following:

- Failure to answer questions correctly
- Hunger
- Poverty i.e. not meeting to expectation as fellow mates
- Absence of textbooks and other learning resources
- Demotion and poor performance in examinations

Abdullahi (2003) suggested the following as ways of helping confused pupils

- Encouragement and reinforcement by the classroom teacher
- Provision of learning materials and appropriate counseling activities
- Paying special attention by sharing love and care

- Sponsorship and recreational assistance
- Show protection, support and care in order to actualize self objectives

Anxiety in classrooms may be in two forms i.e. teacher-generated anxiety which may be due to personality traits, teaching pedagogies, administrative style, scoring and grading techniques, motivation pattern and appraisal of issues. The second form of anxiety is caused by pupils themselves which may include attitudinal changes, peer group movement, association and societies, learning style and reading habit among others.

From the above, a confused person exhibit some characteristic that may directly or indirectly affect learning and achievement in classroom. This assertion is supported by the findings of Adams (2005) and Ladoke (2006) on reasons for poor performance of pupils in science, mathematics and technology.

Anxiety may also be caused by unpleasant reaction or action as a result of provocation or denial from parents, guardians, peers or elders within a given society (Abdullahi, 2005). It is a traumatic experience of chaos, confusion and panic that affect the coordination of the central nervous system. Because the brain and the nerve fails to perform their normal function. Once the cerebrum, cerebellum and the medulla failed to work in unity, there is a haphazard movement of pulse signals leading to confusion, panic, increase pulse rate and behavioral degeneration. Research findings in Karl (2005) have shown that anxiety – related behavioral manifestation in classrooms may be as a result of neglect, denial, deprivation, marginalization and rejection either by the teacher or peer.

In mathematics classroom, ineffective mastery of problem solving skills among pupils or wrong application of mathematical formulae may generate fear, tense and panic leading to poor achievement and low self-esteem. For example, a child that has spent 2-3 hours trying to solve clearly the above example/questions require thinking and effective imagination in order to arrive at a valid conclusion. The combined usage of Bruner, Piaget and Diene's is psychological theories will greatly assist in finding appropriate solution set to the problems enumerated above. Gana (2006), identified features prevalent with a child psychological problems in mathematics classroom to include.

1. Inability to answer question correctly
2. Misuse of formulae and units while solving problems
3. Hunger, poverty and inferiority complex
4. Accident, disease and malnutrition
5. High teacher – pupil ratio
6. Poor counseling services in schools
7. Inadequate teaching and learning resources.

## 2.04 Consequences of Anxiety on Pupils' Performance in Mathematics

Mathematics is one of the school subject often feared by many pupils. The reason is either it is abstract and difficult to learn or it is time consuming and requires considerable attention. Research findings have revealed a decline in the performance of secondary school students in mathematics especially at the Senior School Certificate

Examination (SSCE) conducted by both WAEC and NECO (Nwosu, 2000 and Abdullahi, 2003).

Many anxiety related factors have been identified for the dismay performance of pupils, these include the abs tract nature of some topics, absence of well equipped laboratories, poor teaching strategy adopted by some mathematics teachers, inconsistent government policies on teaching, acute shortage of qualified mathematics teachers, poor motivations, pupil negative perception of the subject among others (Hussaini, 2003).

Hotat (1998), listed a detailed analysis of pupils performance in mathematics, at common entrance exam for the year (1992 – 1997) in respect of some selected primary schools in Minna and its environs as given in the table below:

| Year | % No. of Excellent | % No of V. Good | % No of Pass | % No of Fail |
|---|---|---|---|---|
| 1992 | 4.75 | 11.25 | 21.42 | 62.58 |
| 1993 | 3.24 | 13.40 | 30.11 | 42.25 |
| 1994 | 4.85 | 19.15 | 20.40 | 55.60 |
| 1995 | 5.25 | 12.24 | 19.25 | 63.26 |
| 1996 | 7.14 | 10.50 | 22.10 | 60.26 |
| 1997 | 6.50 | 17.00 | 18.75 | 46.75 |

A cross-examination of the above revealed that between 1992-1997, less than 8% of total pupils enrolment had distinction in mathematics. Similarly, loess than 20% passed mathematics at the credit level. Also over 50% of pupil's enrolment between these years failed mathematics. This situation is sympathetic and generated doubt over the competency of the mathematics teachers. Hussaini (2003) identified the following coherent factors as impending pupil's achievement in mathematics.

(i) Inadequate finding and support for the educational leading to poor instructional strategies.

(ii) Poor curriculum design and implementation strategies leading to hazard arrangement of topics.

(iii) Non-involvement of all stake holders such as teachers, parents, publishers, researchers and administrators.

(iv) Pupils population explosion leading to overcrowding in classes and high teacher pupil ratio. This situation affects service delivery and negates the achievement of set objectives.

(v) Poor school supervision and monitoring.

## 2.05 Mathematics Instruction and Anxiety Management

Mathematics is essential school subject needed for science and technology development. Mathematics as a subject is used in all aspects of life ranging from counting numbers and figures to manipulating them for meaningful decision taking. Due to the importance of mathematics to man and the society at large, the teaching of mathematics was made compulsory from primary level up to secondary school level in Nigeria (National Policy on Education, 2004 reviewed).

Evidences from research findings revealed that many young learners performed very poorly in the subject due to one factor or the other, thereby limiting their career prospects to arrears that demand little or not mathematics (Ado, 2004 and Gana, 2006). Primary education is that form of education given to the children between the ages of (6 – 12 years). It is a preparatory form of education where vital skills and

knowledge are being inculcated in children. The success or failure of a child in future endeavor depends on the quality of training and education received at the early state. Teaching mathematics at this critical level required teacher's understanding, tolerance and dedication while the learners by the virtue of their experience and maturity do not really appreciate the effort of the mathematics teacher.

This is because it is important to note that the first exposure pupils have to do mathematics will be by the teachers' who, more than likely, are not well trained in mathematics and are themselves anxious about mathematics. Consider the dangers projected by a teacher who is forced to teach mathematics; it will be presented in some what strained tone of voice, as a drill or memorization exercise rather than a thinking or problem-solving tool.

Any of these would be enough to scare a young child and this show how and why many pupils begin their first high school mathematics class in a cold sweat. Therefore, a mathematics teacher is required to use a combination of methods towards achieving the noble objectives. This could be done by using materials and resources within and outside the school environment in order to boost classroom learning and enhance understanding.

Famadade (2005) stated that mathematics is a discipline that requires a lot of reasoning, imagination and creativity and that performance in the subject will continue to be on decline unless the mathematics teacher adopts varieties of techniques and strategies. This is to say that the primary school mathematics teacher must de-emphasize the use of lecture method and adopt methods that are pupils-centred such

as demonstration, discovering, expository and experimentation. These methods allow pupils to participate actively during classroom instruction and arouse child interest. Adewumi (2007) observed that pupils generally have low interest in mathematics and may not attend mathematics lesson, while few that may attend do not pay attention to the mathematics teacher. The use of reward in form of prizes and praises could also help to reduce the phobia associated with the learning of the subject.

Hussaini (2003) listed some of anxiety-related factors as militating against effective teaching and learning of mathematics at primary school level to include:

i. Shortage of trained and qualified mathematics teachers at primary level of education.
ii. The method of teaching the subject i.e. rote and memorization teaching.
iii. Acute shortage of mathematics textbooks with better illustration.
iv. The failure by some teachers to relate certain concepts to the real life situation (what is obtained within the learner's environment).
v. Unfavorable government policies in terms of funding employment fostering and remuneration of mathematics teachers.
vi. Anxiety and phobia/tension created by the subject itself on the learners.

These and other factors had adversely affected the nation's drive of attaining economic prosperity and political stability through science and technology. A critical examination of primary school common entrance examination results for pupils in Bida Local Government of Niger State of Nigeria for the years (1998-2004) below.

| Years | %Passed |
|---|---|
| 1998 | 12.3 |
| 1999 | 13.1 |
| 2001 | 11.9 |
| 2002 | 16.5 |
| 2003 | 18.2 |
| 2004 | 17.6 |

Source: Nathaniel, 2005

It is clear from the table 1.1 above that the average percentage passed is 14.3 which are far below the bench mark. This situation is unacceptable to the mathematics teachers, government and the society at large. Abdullahi (1998) identified that mathematics curriculum is one of the problem facing the teaching and learning of mathematics in our primary schools. The curricular in use today were produced long time ago and that its content does not reflect new challenges and innovation of information and space technology. Weakness in curriculum is characterized by the teaching of very old topic instead of modern ones.

Abdullahi (1998) enumerated the following techniques/strategy, by which anxiety can be managed during mathematics instructional to include:

1) Award of praise and prizes
2) Prompt making of class assignment and tests
3) Group experiment work
4) The use of analogy i.e. relating new concepts to familiar ones
5) Systematic teacher-pupil interaction.

## 2.06 Gender and Mathematics Anxiety among Pupils in Primary Schools

It is widely accepted as a fact that the female participation in mathematics, science and labour market is still subjects to major discontinuities. Pregnancy, childbirth, child care and moving houses due to marriage or husband job change are factors responsible for low performance and contribution of women in national development. Given their interrupted work record, many women are particularly vulnerable especially when jobs are shed on a "last in" first out. The implication of low literacy level of women is attributed to the difficulty faced in meeting their multiple responsibilities despite principal provider and promoter of good health.

Female who want to be scientist often complain that the traditional school curriculum, assessment, procedure and teaching/learning strategies do not fit their learning styles. In fact, Wisker (1989) emphasized that female pupils usually feel that their interest and responses are considered unacademic, and the established teaching and learning styles of a male dominated education give little space to the female to hear their view or to value their own responses, the directive, authoritarian and competitive styles adopted by many mathematics teacher do not suit many of the female pupils. Okeke (2001) stated that cooperative learning style favour/produce better performance in science among the female learners while competitive learning style favours male learners.

## 2.07 Diagnosing Pupils Learning Difficulties Arising from Anxiety

An important function of a mathematics teacher is to monitor and guide the development of ideas in the minds of pupil/pupils and central to this process is the

effective diagnosis of misconceptions, confusions and incorrect strategies amongst pupils. In solving mathematical problem, a lot of errors may be introduced because of the unstable nature of ones mind. For example, a pupil may be called by the teacher to solve the problem.

2443 +

5016

This pupil might recopy the problem to be

2434 +

5106 as a result of anxiety.

The final answer to the problem will be 7 5 4 0 instead of 7 4 8 9. similarly, re-arranging numbers 24, 48, 34, 43, 76, 22, 14 and 99 in ascending order. A confused pupil may arrange them as 14, 24, 34, 22, 43, 48, 84, 76, 69.

The diagnostic power of error analysis lies in the fact that pupils mistakes in doing mathematics are frequently systematic.

However, too often, teachers have failed to exploit this systematically. The psychometric nature of assessment in schools has effectively precluded analysis of error patterns and instead teachers have tended merely to mark answers right or wrong. Abdullahi (1998) observed that the failure by mathematics teachers to use children's errors to diagnose misconceptions and flawed procedures can have serious consequences and delayed purposeful learning. In support of such assertion, Davis (1999) has suggested that in analyzing errors in the classroom, teacher should be

aware of the syntax and logic error type that is often associated with individual or group. For example

4 x 4 = 8

2x 3 = 6

6 ÷½ = 3

This type of error is of "development index" that is mistakes made by some people at the earlier stage are been transferred to later state of learning.

Research finding have clearly indicated the role of mathematics teacher as a mediator for pupils' performance in mathematics. Errors are misconceptions or wrong use of some marks symbols or punctuations while solving a problem. The way and manner error manifest may be difficult to trace or identify. What is therefore important is what mathematics teacher do to minimize error and sustain positive problem-solving habit among pupils in primary schools.

## 2.08 Strategies for Improving Depressed Pupil's Interest and Attitude Arising from Anxiety

Mathematics is a subject made up of symbols, figures and special characters. Learning mathematics requires that the learner develop interest and willingness to accomplish the tasks. Interest is defined as the feeling of intentness, concern or curiously about an object. It is the quality that arouses concern or curiosity which hold a child's attention on an object (Obodo, 1991) the degree and direction of interest is often determine by attitude, while attitude is fundamental to change in behavioural manifestation.

Evidence have shown through research findings that primary school pupils have low interest in mathematics and this is manifested in their poor performance at common entrance examinations (Obodo 1991; Hussaini, 2003 & Famalade, 2005). Naturally, when children are afraid of a subject, they do everything humanly possible to avoid the teacher and the classroom exercises. Failure to participate actively in class work and assignments will lead to underachievement in the final examination.

Eze (2004) identify the following factors among others as the causes of pupil's low interest in primary mathematics. These include: the abstract nature of mathematics, the mathematics teacher factor, absence of instructional aids and laboratory facilities, poor pupils' background, influence of peers and the use of specialize language among others.

Mathematics is highly structured and some topics in it are considered abstract. The use of certain symbols such as a Ψ β θ Ω0 etc. can neither be correlated with physical object or event happening within the learners' environment. They therefore reason that mathematics is for people with special brain and talents. They considered the subject difficult and time consuming. Providing explanation for some formulae requires critical reasoning and patience on the part of the learner.

The mathematics teacher can help in one way to determine pupils' interest in the subject. Some teachers that teach mathematics do not have pre-requisite interest and therefore make unpleasant comments before the pupils about the subject. Some mathematics teachers even avoid teaching certain topics or arrears. Also, if a teacher is

ill-motivated and not regularly paid, he/she grudge and complain being unhappy, weak and hurry. The aftermath is low productivity and consequently underachievement.

Most primary schools in Nigeria lack functional laboratories to which pupils and their teacher can make consultation and experiment. Some teachers do not know what it entails to set a mathematics laboratory. Certain topics in primary mathematics require practical approaches, for example, the construction of geometrical shapes, geoboard, quadratic equation box, conversion of number bases and design of a game among others require the use of laboratory. Absence of laboratory in school will adversely affect both the teacher and student productively.

The need for primary pupils to be familiar with mathematical bases can not be over emphasized. It is design in such a way that performance at higher level is a dependable of skills and knowledge acquired at lower level of mathematics. Research studies have revealed that primary school mathematics teachers do not complete their scheme of work in a term (Obodo, 2002). The completed portions of the scheme are not even well understood by the pupils, this is a serious setback to higher level mathematics training/learning.

Having examined some factors that causes low interest in mathematics, we will state ways by which pupils' interest can be aroused, generated and sustained throughout the learning periods of mathematics. Obodo (1991) identified intrinsic and extrinsic motivation, mathematical games and simulation, effective use instructional materials, relating mathematics to other subject teachers as ways of generating and sustaining pupils' interest in mathematics.

The growing awareness of the presence of individual difference in the learning potential and performance through the years has been and may continue to be major curriculum problem in designing and implementing primary school mathematics program (Sark, 2003). Psychologist believes that attitudes and interest are important in student effective learning of mathematics.

Attitude:

Attitude is defined as a mental state of readiness organized through experience, exerting a direction on dynamic influence upon the individual's response to all objects and situations with which it is related. Sark further stressed that if a child has a positive attitude towards mathematics, he will not only enjoy studying it but will derived satisfaction from the knowledge of mathematics idea he gains. This goes to explain why attitude is as driving force for attention and interest in the act of learning.

Obodo (2002) state that if attitude is the way a student feels, thinks and is predisposed to act towards mathematics for example, then it shows pupils attitude lead to interest of the parents, pear-group and society to math's can as well determine pupils achievement in the subject. Learning mathematics requires that the learner develop interest and willingness to accomplish the tasks.

Interest:

Interest is the qualities that arouse concern or the desire to perform a task that bring joy and satisfaction. Evidence have shown through research findings by (Deji 2004, Tole 2006) that primary school pupils have low interest and paid little or no

attention during mathematics lesson. The low attention is manifested in the pupil's poor performances at common entrance examinations. Naturally, when a child is afraid of a subject, he/she do everything normally possible to avoid it and hence under-achievement. It is therefore essential for mathematics teacher to create the enabling environment for affective participation of student during classroom instruction. The work of cognitive psychologist has shown that learning mathematics at primary school level is highly individualistic. This means while a student may aided in his/her attempt to solve a mathematical problem, he has to do the solving himself.

Piaget's ethnical interview approach to the child learning process has revealed to educators that it is a mistake to view children's answer and question and questions from adult perspective and thus classifying them on those grounds as right or wrong. It is acceptable to give reward and praises on the child that has performed better in a given task. This will reinforce the beneficiary and gingered others.

Motivation is a key element in knowledge acquisition and manipulation thus a well-motivated pupils and teachers perform better than their counterpart on the same level that is ill-motivated. To teach without using extrinsic rewards is analogous to asking pupils to learn to draw with their eye closed. Mark (1999) observed that student performance in mathematics at primary level was associated not only with their level of experience and types of abilities but also with at least three thinking styles (judicial, executive and legislation). In his study the highest predictive power was demonstrated by the judicial style. This judgment shows that a significant portion of mathematics activities was based on analytical work which involved comparing, computing,

contracting and evaluating the concept of interest, attitudes and motivation on learning outcomes of pupils in mathematics revealed a dependable relationship among the variable.

This means that with positive interest and attitudes a child will be motivated to listen and learn, the rate of comprehension and assimilation of learning task would have risen. Motivation is used to sustain the current status of a positive learning achievement in school subject. Positive interest and attitude is a reflection of the acceptance of the central nervous system. Once a child develop these manipulative skills (construction and trigonometrically areas of mathematics. The work of Piaget and Dienses are in support of the above assertion since they suggested that concrete experience is almost always necessary underpinning the conceptual learning of new materials. In children, as new concepts are assimilated, there is interference and conflict within the hemisphere on where the new and the old stayed i.e. the storage area. It takes a little time before an agreement is reached, while in some humans, it take a long time. The delays in conflict resolution affect assimilation; accommodation and retrieval of knowledge.

## 2.09 Instructional Materials for Improving Pupils Achievement in Mathematics Arising from Anxiety

A good teaching material is a piece of apparatus or objects which are used by teacher to promote pupils' understanding of some abstract terms. They are use to explain concept, portray reality, visualize ideas about nature and awaken interest.

Mark (1999) describes teaching/instructional material as systematic way of designing, using available resource to overhaul the entire teaching process. Instructional material is therefore seen as anything which aids teaching particularly the student and teacher to achieve desire outcome in terms of skills acquisition and mostly. It is a known fact that learning mathematics especially at lower level requires handling of equipment and materials by pupils in order to make learning meaningful and worthwhile. But because of depressed state of economy, it has become difficult for many stakeholders to have these materials at their disposal.

Vincent (2003) summarized the benefits of using instructional materials in mathematics teaching particularly at primary school level to include:

(a) Arouse and sustain pupils' interest throughout the lesson

(b) Reduce the burden of workload on teachers

(c) Enhance understanding by removing the abstractness

(d) Facilitate knowledge transfer.

## 2.10 Implication of the Literature Review to the Present Study

Anxiety is an act that generates tense and degenerate performance among school children. It reduces children to the stage that they are unable to solve problem that will hitherto be easy under normal situation. In education anxiety is introduced or generated either by the teacher or the learners themselves. Teacher generated anxiety may arise due to teaching pedagogies, personality traits, scoring pattern, administrative style, learning reinforcement, assessment techniques and appraisal activities. Perhaps as mathematics educators, researchers and policy makers we should abandon our

eternal search for the best method and realize that regardless of the rhetorical flourishes we use to describe classroom practice, in the end what we inevitably have are teaching/learning interactions that we would hope would be productive of powerful mathematical and self knowledge's for all learners. There is no one proper way to teach mathematics that could apply across all contexts and cultures. A collation of many teaching approaches can be valuable in having students come to know the mathematics and to know themselves as agentic mathematicians in-the-making However, the teacher must act in powerful ways to gauge and take into consideration the intellectual and social experiences of her his students. As well, s/he must strive to authorize student initiated voices and ways of making sense of the mathematics and learning procedures.

As previously mentioned, to experience oneself as agentic is to have a sense of self as a respected and competent participant able to go beyond the given to forge something new; agency, or the lack of it. is discursively produced, not an individual attribute or disposition. At the completion of each lesson the teacher might ask: *what* mathematics did you learn today, *how* does it relate to what you already knew, *how* did you learn it. was it in a way that was easily understood, could it be learned in another way In this way. the pedagogy, not the individual learner, is the object of inquiry and made problematic.

There is, too, the question of the application of constructed mathematical knowledge in new contexts. Although a large literature has developed around this issue of recontextualization, a postructuralist analysis of the coercive and constitutive

relationships of power in school mathematics makes any simplistic notion of transfer problematic. It may be that what we teach, if we continue with drilled procedures and skill based strategies, will not be relevant to the world of work in these new times. Or it may be in how we teach we fail to inspire and challenge, we put students off further learning in mathematics and turn them away from careers where higher levels of mathematics are required. Students may end up knowing quite a lot of mathematical facts and procedures but their identify might be so fractured that they cannot countenance work or further study in this area.

On the other hand, pupils (learners) may induced anxiety as result of low self-confident, peer influence, teacher-related factors, family background, class size and learning facilities.

The following are the likely outcomes of an anxiety threatening mathematics classroom instruction.

(i) Minimal pupils' participation in class activity arising from fear and low self-esteem.

(ii) Divasting performance in mathematics.

(iii) Attitudinal change leading to the development of hatred for the subject and the course teacher.

(iv) Rejuvenated thinking and reason as a result of poor perception and interest in the subject matter.

(v) The development of pervasive behavior by school children leading to massive destruction of school infrastructure and learning facilities.

## 2.11 Summary

This chapter reviewed related topics on anxiety i.e. causes, its form and symptoms and effect on the teaching/learning process.

Particularly at the primary school level. Falcon (2003) identified three (3) causes of anxiety among school children in a research carried out to investigate the level of primary science. He observed in his finding that the persistent failure in performance in primary science was due to the abstract nature of the subject which often created phobia and anxiety. The performance of primary school pupils in mathematics x-ray and possible remedies identified and recommended. Tsado (2005) observed that poor instructional strategy ill-equipped mathematical laboratories, absence of qualitative audio visual equipments, poor motivation among teachers and pupils unfavourable government policies and curriculum related problems among others are factor responsible for continual decline in achievement.

The chapter also reviewed areas of conflict management and intervention options especially in geometry and basic arithmetic computing. It was observed that pupils perceived two dimensional and three dimensional objects independently. The reason may be the level experience, age and maturity. In geometry, objects such as rectangle, cuboids, cone, cylinder, pyramid, frustum, ellipse etc. may share one or more characteristics thereby requiring unique attention and skills in their transformation, sketching and manipulation.

# CHAPTER THREE

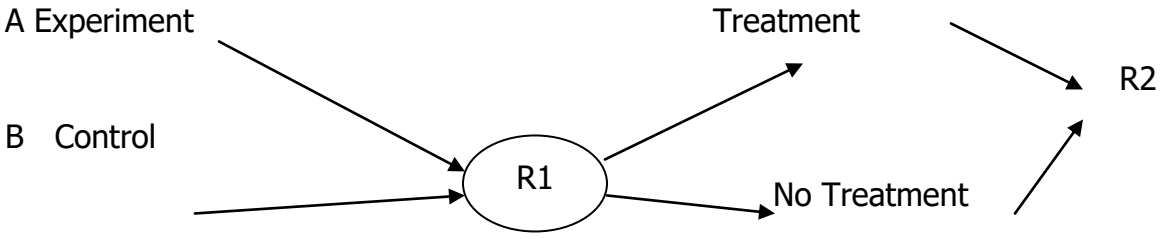
# METHODOLOGY

## 3.1 Introduction

This study on the effects of method of teaching mathematics on anxiety in Niger state primary schools examine factors like stress, panic and restlessness and their consequent effect on pupil's achievement in mathematics. This chapter incorporated a description of the research design, population sample and sampling techniques, research instrument, validity and reliability of the instrument, method of data collection and method of data analysis.

## 3.2 Research Design

The study adopted a pre-test and post-test design. For this design, a large number of primary school pupils were sampled and the samples are divided into two groups. Group A was the experimental group that used unified method that invoke more of inquiry, demonstration, problem solving and group experiment strategies while the Group B which is the control group used the conventional lecture method using the talk and chalk technique (Taylor, 2001). . The two groups were pre-tested to determine their entry level equivalence. A post-test was administered on both groups and the result were analyzed, after two weeks of class room instructions on carefully selected topics in mathematics.



Where Experiment are pupils taught mathematics with methods other than lecture, Control are pupils taught mathematics with the traditional lecture method.

R1 – before the treatment, and

R2 – after the treatment.

The essence was to provide a lead way for the development and assessment of both the dependent and independent variables.

## 3.3 Population

The target population for this study included all pupils in the primary schools in Niger State. There are three education zones in Niger State i.e. Zone A, B, and C. Each zone had specific number of primary schools as indicated in the table 3.1.

**Table 3.1: Pupils' population distribution across the three educational zones in Niger State**

| Zone | Sex | No. of Prim | No. of pupils |
|---|---|---|---|
| A | Male | 296 | 110,873 |
| | Female | | 122,625 |
| B | Male | 287 | 95,648 |
| | Female | | 114,138 |
| C | Male | 195 | 89,043 |
| | Female | | 75,625 |

Source: SUBEB, 2008

## 3.4 Sampling and Sampling Technique

This study was conducted in all selected primary schools in three educational zones of Niger State. The sample for this study consisted of two hundred and seventy (270) pupils randomly selected from the six primary schools within Niger State. Two primary schools was selected for each of the three educational zones of the Niger State. The sampling technique was the stratified random sampling using heart drawn method. The reason for the choice of this is because of the large number of primary schools in Niger State. The table 3.1 below shown a breakdown of selected primary schools across the zones

**Table 3.2: below shows a breakdown of sample across three zones of Niger State.**

| School | Zone | M | F | Total |
|---|---|---|---|---|
| Ibrahim Tako Primary School Bida | A | 25 | 20 | 45 |
| Central Primary School, Lemu | A | 25 | 20 | 45 |
| Kurokpa Primary School, Paggo | B | 25 | 20 | 45 |
| Maitumbi Primary School, Minna | B | 25 | 20 | 45 |
| Yakila Primary School, Yakila | C | 25 | 20 | 45 |
| Lafene Primary School, Kagara | C | 25 | 20 | 45 |

## 3.5 Research Instrument

The instruments used were two standardized Questionnaire. These are:

i. Mathematics Achievement Test (MAT)

ii. Anxiety Mathematics Questionnaire (AMQ).

The instruments were modified to suit the study and were used accordingly

### 3.5.1 Mathematics Achievement Test (MAT)

The MAT consisted of thirty (30) multiple choice questions with options (A – D). Pupils were expected to circle the correct option to each question. The questions were drawn from past common entrance examination covering vital topics in primary mathematics curriculum. Each question answered correctly was scored 2 marks and the overall score which is over 60 was converted to percentage.

### 3.5.2 Anxiety Mathematics Questionnaire (AMAQ)

AMAQ was adopted by the researcher from Adamu (2005) on the effect of mathematics anxiety on selected primary six pupils in Adamawa State. Some selected primary schools pupils used for the study were used to compare mathematics anxiety across teaching approaches. They were selected on the basis of possible contrast as far as the approach to teaching mathematics is concerned. The teaching approaches were Inquiry, Lecture, Demonstration, and Problem-solving.

## 3.6 Validity of Instrument

Modified Mathematics Achievement Test (MAT) and Anxiety Mathematics Questionnaires (AMAQ) were validated by four experts from Ahmadu Bello University, Zaria and Niger State College of Education, Minna in Mathematics Education. The validators examine the content of the items in MAT and AMAQ and provide necessary corrections so as to meet the characteristics of the research instrument. The instruments were further given to the researcher's supervisor for final corrections.

## 3.7 Reliability of the Study

To determine the internal consistency and reliability of the research instrument used, a pilot study was conducted using two primary schools in Minna (Bosso Primary

and Anguwan Biri Primary School). These schools selected for the pilot study was not used for the main study. To determine the reliability of the instruments, the two instruments were administered on the pupils twice in an interval of two weeks. A moment correlation coefficient formula was used to determine the reliability/correlation coefficient. A value of 0.84 was obtained, this show the test items was highly reliable and consistent.

### 3.8 Method of Data Collection

The two instruments (MAT and AMAQ) were personally administered on the respondents by the researcher and was assisted by two mathematics teachers. The assisted mathematics teachers were briefed on the objective of the study so as to avoid their influence on pupils responses. Before the administration of the items, the pupils were pre-tested to determine their entry level status. A two weeks classroom instruction was carried out by the researcher on the groups. The experimental groups were exposed to the unified methods while control groups were left with traditional lecture method. The topics covered during the two week instruction were geometry of solid and mensuration of number, the researcher used each of the teaching strategies named above in the teaching while the questions were set to reflect the teaching approaches across the three educational zones of Niger State.

The items of the two instruments were scored using a carefully prepared marking scheme. The scores for MAT and AMAQ was later correlated to determine their significant relationship based on teaching approaches. The scripts were categorized into male and female group to determine whether gender had influence on the level of

anxiety manifestation. The results from the post test were classified into high, medium and low anxiety level provide basis for the discussion of the research hypotheses earlier stated.

### 3.9 Methods of Data Analysis

The scores from the test items on two hundred and seventy (270) pupils randomly selected from 6 primary schools across three educational zones of Niger State were collected and analyzed. The mean, t-test, analysis of variance (ANOVA) at 0.05 level of significant were used as statistical tools to analyze data/score gathered. The choice of ANOVA and t-test was because it is:

i. Appropriate for comparison of multiple variable and

ii. Minimal error.

iii. The ease with which data can be interpreted and interpolated.

# CHAPTER FOUR

# RESULTS AND DISCUSSION

## 4.1 Introduction

This chapter presented the analysis of data collected from the Mathematics Achievement Test (MAT) and Anxiety Mathematics Achievement Questionnaire (AMAQ) on the 270 primary school pupils randomly selected from 6 primary schools across the three educational zones of Niger State. The results are presented in tables below for easy interpretation and understanding.

## 4.2 Results and Discussion

**Table 4.1:** Analysis of pupils' achievement in mathematics pretest

| Category | N | Mean ($\bar{x}$) | S.D | Rutherford's Ratio(¥) |
|---|---|---|---|---|
| Control | 135 | 3.42 | 0.243 | 0.21ns |
| Experimental | 135 | 3.39 | 0.325 | 0.18ns |

Table 4.1 above reveals the mathematics pretest achievement of 270 selected primary school pupils across the three educational zones of Niger State. The table shows the mean, standard deviation and the Rutherford ratio of both the experimental and the control groups.

The mean performance of 3.42 and 3.39 for the control and experimental groups respectively was not significant. These figures and their corresponding standard deviations revealed an entry level equivalence of both groups. In other word, all the primary pupils randomly selected and used for the study had similar experience and

exposure in mathematics. The Rutherford value of 0.21 and 0.18 for the two groups were also not significant, hence there is a match in the academic performance of the control and experimental group before the treatment.

**1. $H0_1$:** There is no significant difference in effects of methods of teaching mathematics performances of primary school pupils in Niger State

**Table 4.2a:** ANOVA analysis of pupils' performance based on methods.

| Source | DF | Sum of square | Mean square | F | P |
|---|---|---|---|---|---|
| Between Groups | 4 | 20964 | 5241 | 0.41 | 2.34 |
| Within groups | 266 | 55860 | 210 | | |
| Total | 270 | 76824 | | | |

Significant at the 0.05 level

**Table 4.2b**

ANOVA analysis of pupils' performance on the zonal comparism using unified teaching methods

| Source | DF | SS | MS | F | P |
|---|---|---|---|---|---|
| Between Groups | 3 | 918 | 33061 | 0.21 | 1.32 |
| Within Groups | 267 | 33642 | 126 | | |
| **Total** | **270** | **42825** | | | |

Table 4.2a and 4.2b above revealed ANOVA analysis of primary school pupils' achievement in mathematics of stable and instable emotion during classroom instruction using varied methods. An examination of figures on the table 4.2a shows the sum of squares between various instructional methods (inquiry, lecture,

demonstration and problem solving) and within groups to be 20964 and 112560 respectively. The mean square values of 5241 and 210 for between and within groups are highly significant. These figures indicates that pupils with low anxiety and taught mathematics using better technique performed better than their counterparts with high level of mathematics anxiety.

Similarly, table 4.2b: shows ANOVA analysis of pupils performance in the three educational zones of Niger State. The zones are A,B,C, hence between groups of 3 and within groups of 267. The mean square values of 3061 and 126 for both groups is significant. Similarly, the F and P values of 021 and 1.32 respectively are also significant. This result revealed a differential in pupils performance in mathematics across the three zones using inquiry and problem-solving methods. It was noticed that pupils in zone A and B favoured inquiry method of teaching mathematics while problem solving was highly acknowledged by pupils from zone C. This finding suggests that teaching methods affects pupils' performance in Mathematics. This finding is based on the fact that lecture method of teaching is teacher-centered and does not allow pupils to express themselves either in written or verbal. The findings of this study specifically on tables 4.2a and 4.2b is in agreement with Abdullahi (2003) research findings on the effect of instructional strategy on pupils' performance in primary science. His study categorically identified unified methods as the best technique of teaching mathematics at primary five and six level.

Also in support of this finding is Ladoke (2006) which suggested that the mathematics teacher must be patient, trustworthy, courageous and hardworking so that

the phobia associated with the learning of the subject can be removed. His research finding had shown that the selected primary five pupils that are well motivated and encouraged perform better than their colleague that are ill-motivated and less courageous.

Similarly, the F-ratio of 2.4 and the probability value of 0.41 is significant. From the figure on table 4.2a above, the null hypothesis one was rejected, hence pupils with low level of mathematics anxiety performed better than their counterparts with high level of mathematics anxiety.

**2. $H0_2$:** There is no significant difference in teaching methods between the mean scores of male and female pupils on anxiety.

**Table 4.3a:** T-test analysis of male and female pupils' achievement in mathematics using unified methods of teaching.

| Sex | Mean ($\bar{x}$) | Standard Dev | $t_{cal}$ | $t_{critical}$ | Pvalue |
|---|---|---|---|---|---|
| Male | 3.73 | 0.245 | | | |
| Female | 3.68 | 0.328 | 0.46 | 1.32 | 0.0lns |

Table 4.3a above shows the performance of boys and girls in mathematics from selected primary schools in the three educational zones of Niger State. The boys had mean and standard deviation values as indicated in table 4.3a of 3.73 and 0.245, while the girls had 3.68 and 0.328 for mean and standard deviation respectively. A critical examination of both mean and standard deviation values showed correlation in the achievement of both gender in mathematics. Similarly, the calculated t-value of 0.46 is

less than the critical value of 1.32 and also the p-value of 0.01, shows there is no significant difference in the achievement of male and female pupils with mathematics anxiety-related problems.

**Table 4.3b** Mean analysis of boys and girls in mathematics anxiety based on instructional pedagogies

| Methods of Instruction | Low Anxiety | | High Anxiety | |
|---|---|---|---|---|
| | $\bar{x}_B$ | $\bar{x}_G$ | $\bar{x}_B$ | $\bar{x}_G$ |
| Inquiry | 4.13 | 3.98 | 2.58 | 2.61 |
| Lecture | 3.28 | 3.3 | 2.96 | 3.04 |
| Demonstration | 3.72 | 3.90 | 2.28 | 2.45 |
| Problem-solving | 3.98 | 3.88 | 2.56 | 2.53 |

Also, table 4.3b revealed the mean analysis of boys and girls from selected primary schools in Niger State based on the methods of teaching mathematics anxiety. A cross-examination of figures on the table 4.3b indicated mean values for low and high level mathematics anxiety for the four teaching methods (inquiry, demonstration and problem solving). For low Mathematics Anxiety, the boys had mean values of 4.13, 3.28, 3.72, 3.98, 3.90, 3.88. Clearly, these values are not significantly different. This means that there is no significant difference in mathematics achievement of pupils (boys and girls) with low mathematics achievement of pupils with low mathematics anxiety.

Similarly, 2.58, 2.96, 2.28, 2.56 as against 2.61, 3.04, 2.45, 2.53 was recorded for boys and girls with high mathematics anxiety. A comparison of these mean values for both gender show no significant difference. This result also indicated that both boys and girls performed high anxiety level.

In view of the values and figures on the tables 4.3a and 4.3b above, the null hypothesis II which states that there is no significant difference in mathematics achievement of boys and girls with anxiety related problems is not rejected. This finding indicates equal achievement manifestation of both gender in mathematics arising from either low or high mathematics anxiety level.

This finding is in agreement with (Karl, 2005) on the effect of errors, misconceptions and fear on the mathematic achievement of primary three pupils in Okene Local Government area of Kogi State. Karl's research analysis and findings revealed a devastating effect of anxiety on pupils understanding comprehension and application of some mathematical concepts. His finding explains that anxiety manifestations are of the forms panicing, daydream, confusion, stress, high blood pressure, irregular heart beat among others. The study by Karl (2005) also suggested that mathematics anxiety and phobia could be reduced through drill and practices, tutorials, computer assisted instruction (CAI) and simulation. The use of variety of instructional strategies (inquiring, demonstration, lecture and problem solving) will serve as moral boaster, thereby facilitating easy communicating between the teacher and the students. Also, abstract concepts and terms will be these strategies be fully explained.

**3.** **$H0_3$:** There is no significant relationship among symptoms of anxiety of primary school pupils.

**Table 4.4:** Analysis of anxiety symptoms and manifestations among school children in mathematics .

| Symptoms/Manifestations | N | Mean (x) | Standard Dev | Fernet Ratio | Remark |
|---|---|---|---|---|---|
| Panicking | 42 | 1.95 | 0.345 | 0.3 | Highly significant |
| Restlessness | 42 | 1.84 | 0.623 | 0,2 | " |
| Heart pounding | 42 | 2.36 | 1.473 | 0.4 | Moderate |
| Illusion | 42 | 2.14 | 2.764 | 0.5 | " |
| Fear | 34 | 3.20 | 2.700 | 0.4 | " |
| Misconception | 34 | 2.45 | 1.396 | 0.7 | Low |
| Confusion | 34 | 2.75 | 1.013 | 0.6 | " |

Table 4.4 above shows the analysis of mathematics anxiety symptoms and manifestations among primary school pupils in Niger State. Some of the manifestations include panic, restlessness, heart pounding, illusion, fear, misconception and confusion. A cross examination of the figures on the table 4.4 above shows mean values of 1.95 and 1.84 for panic and restlessness respectively. These figures are very low and indicated poor performance in mathematics. Also, the f-ratio of 0.3 and 0.2 indicated high significant level. Since the f-ratio is less than threshold value of 0.4, it means that panicing and nervousness hindered effective teaching and learning of mathematics

among primary pupils. Beside, teaching methods and teachers personality had significant effect on their mathematics achievement. The use of unified methods had help in reducing fear and creating confidence among pupils while solving mathematics problems.

Table 4.4 also shows the mean values and F-ratios for varieties of anxiety symptoms and manifestations among school children. An examination of the table 4.4. above shows

Heart pounding ( $\overline{x}$ = 2.36,¥=0.4)

Illusion ( $\overline{x}$ = 2.14, ¥=0.4)

Fear ( x=3.20, ¥=0.4)

Misconception ( x=2.36, ¥=0.7)

Confusion ( x=2.750 ¥=0.6).

The figure above indicates significant level of impact on pupils' achievement in mathematics. This findings is in agreement with the research finding of Douglas (2001) on the level of achievement of mathematics among primary six pupils at Bajera staff school. A similar study by Abel (2005) on assimilation process and recall capabilities of primary four pupils in public schools in Ondo shows that fear, confusion and panic had hindered the ability of 90% of primary four pupils to recall multiplication table. This means that anxiety is a detractor and a setback to academic achievement.

## 4.3 Finding of the Research

This study was conceived to examine the effect of methods of teaching mathematics performance and anxiety in Niger State Primary Schools. The findings of

the study revealed that mathematics anxiety and teaching methods had profound effect on pupils' achievement, because it hinders students learning of mathematics. Students with mathematics anxiety and psychological disorder earn little mathematics, because what they learn is memorization without understanding the concept. The findings of the study also revealed that with effective and appropriate teaching methods, learning mathematics will be made easy and pupils' achievement in the subject will be enhanced. Findings from this study had revealed that unified techniques could help to reduce phobia associated with the learning of some concepts in mathematics.

The findings on tables 4.2a&b, 4.3a&b and 4.4. agree with research findings by (Adam 2005 and Ladoke, 2006). Their findings indicated low academic achievement in science and mathematics by pupils with psychological problems arising from anxiety and related threats, while pupils that are free from these threats performed significantly better. Findings of researchers like (Julius, 2002; and Mark, 2009) show that mathematics anxiety is related to mathematic achievement. Students or pupils with low anxiety level are found to achieve better in mathematics than pupils with high level of mathematics anxiety. Thus, mathematics anxiety determine the level of pupils achievement and academic progress in school.

However, Adewumi (2007) maintained that certain level of mathematics anxiety is needed by the pupils in order to be motivated to learn especially in the learning of mathematics problem solving.

The findings on table 4.3a&b shows closeness in the achievement of boys and girls in mathematics as a result of anxiety threats. The $t_{cal}$ and $t_{critical}$ values are clear

indication of no significant difference. This finding is in support of James (2004) research on gender influence in science and mathematics achievement at primary six schools in Nasarawa local government of Nasarawa state.

Table 4.4 above shows comparism of the various anxiety symptoms and manifestations with their corresponding negative effect on the learning of mathematics. While panic and nervousness top the list, confusion, high blood pressure, heart pounding had moderate negative effect on the learning of mathematics. Abel (2005) asserted that learning topics such as properties of shapes, fraction, mesuration, quadratic equation and everyday statistics requires patience, carefulness, and systematic approach. These topics and associated concepts require unique strategy and approach by mathematics teacher during classroom instruction.

# CHAPTER FIVE

## Summary, Conclusion and Recommendation

### 5.1 Introduction

In this chapter, the summary of the findings from the study are presented. As the conclusion and recommendations are also highlighted.

### 5.2 Summary

This study was carried out to investigate effect of methods of teaching mathematics performance on anxiety in Niger State Primary Schools. In order to identify factors responsible for the teaching/learning of mathematics as a result of anxiety. The sample consisted of two hundred and seventy pupils randomly selected from six primary schools across the three Educational Zones of Niger State. Each educational zone had two schools with a total population of ninety pupils. However, the targeted populations are all primary school pupils in Niger State.

The study was undertaking to seek answers to the specific questions and hypotheses stated in chapter one. The study had three objectives:

(i) To examine the effect of mathematics teaching methods on anxiety in Niger State Primary Schools.

(ii) To establish gender related influence on pupils' achievement in mathematics in Niger State.

(iii) To determine the effect of varied teaching methods and anxiety manifestation on pupils achievement in mathematics.

Two instruments were used for the purpose of data collection and analysis. A 30-item MAT development and validated by experts in a 30-item multiple choice achievement test and the Anxiety Mathematics Questionnaires (AMAQ) also validated by experts in mathematics education.

The data collected from the test were analyze using means, t-test, and Analyses of Variance (ANOVA) to test the hypotheses at 0.05 level of significant. The result and discussion are reported in chapter four.

## 5.3 Summary of Findings

The summary of findings from the result are as follows:

i. Male and female pupils do not differ in their responses to anxiety-related threats especially in mathematics based on teaching methods.

ii. Pupils differ in their mathematics achievement based on instructional strategy i.e. unified methods of teaching yielded better result than lecture method.

iii. Parental status, teacher qualification and experience and the school environment play a vital role in anxiety and stress management among primary school pupils.

## 5.4 Conclusion

The following conclusions were drawn from the findings of the study.

(i) There were no significant difference in the mathematics achievement level of boys and girls arising from anxiety related factors based on the teaching methods.

(ii) There was a significant difference in mathematics achievement level of pupils based on different teaching methods used.

(iii) Achievement in mathematics is related to the level of motivation and reinforcement pupils received during and after classroom instruction.

(iv) Genetic and hormonal inadequacies might create/generate anxiety and high blood pressure.

## 5.5 Recommendations

In the light of the findings listed above, the following recommendations are made:

(i) Government and other stakeholders should organized in-house training workshop for mathematics teachers especially on methods that concretize learning and reduce anxiety.

(ii) Mathematics educators should re-appraise the use of inquiry, demonstration and problem-solving methods of teaching with the view of making it more effective and result oriented.

(ii) Teachers should be more friendly with their pupils and be more committed to work. This will help reduce the phobia that mathematics is difficult and meant for special pupils.

(v) Parents and guardians should provide necessary support and encouragement towards mathematics and science in general for sustainable development in all sectors.

(vi) Pupils should be given enough time and more examples in order to stimulate their comprehension ability.

## 5.6 Suggestions for Further Studies

Based on the findings of this research work, a further studies may be suggested in the areas of children assimilation or deprivation arising from anxiety, Generic trends in mathematics teaching and learning arising from anxiety and hunger and the effect of child abandonment and hunger on the learning outcome of primary school mathematics.

## REFERENCES


Abdullahi, L. (1998). *The Nature And Technique Of Teaching Science In Nigeria.* Atolo Press Ltd. Ilorin., Vol. (1), 23-28.

Abdullahi, L. (2003). *Exploring the Science Teaching in Nigeria Ilorin: Atoto Press.,* Vol. (3), 56-73.

Abdullahi, A. (2005*). Science Teaching in Nigeria* Ilorin: Atoto Press Ltd.

Abd, O, and Yokai E. (2006). *Problems of Mathematics Education in Nigeria.* Ibadan Adegu Publishing Company Ltd.

Abel, O. (2005). *Anxiety and its Manifestations in Mathematics Classroom. A Key Note Address on the Occasion of "Science Week Celebration"* Government College Abaji, Abuja.

Adam, E. (1999). *The Study of Correlation between Mathematics Grade and Biology.* Unpublished Ph. D Project Report Institute of Education University of Ibadan.

Adamu, S. (2005). *Anxiety in Mathematics Classroom (Cause, Effects and Prevention)*. Journal of Mathematics Education, Vol. 6 (2), 21-27.

Adewunmi, B. (2007). *Cognitive Development in Advanced Mathematics using Technology*. Mathematics Education Research Journal 201,11-19.

Ado, L. (2004) and Gana E. (2006). *Analysis of Students Achievement in Mathematics at Senior School Certificate Examination (SSCE) in Niger State* Unpublished B. Tech (Ed) Thesis FUT Minna.

Alabide, E. (2003). *Stress Manifestation and Management in Mathematics.* Journal of Mathematics Education Vol. 211, 2-19.

Bala, T. (2001). *Effective Strategy and Methods of teaching Mathematics at Secondary School Level*. Unpublished Keynote Address. 13th Convocation Lecture.

Bayo, L. (2004). Stress and Anxiety as a Tool for Under *School Development in Secondary Mathematics in Nigeria*. Unpublished Med Thesis Unilorin.

Davis, U. (1999*). Social Status and Psychological Disorder among Primary Schools Pupils in Mathematics*. Journal of Abnormal Psychology 71, 114-134.

Deji, M. (2004*). Anxiety a Manifestation of Brain Disorder*. Jos: Williams and

Wilkin Publisher Ltd.

Eze L. (2003). *Mathematics as a Servant Subject*. Journal of Teacher Professional Development 2(3).

Falcon, O. (2003). *Difficult Concepts in Primary Mathematics Curriculum as Perceived by in-service Mathematics Teachers*. Journal of Mathematics Education 7(2) 33-48.

Famadede, U. (2005*). Effect of Visual Materials on Learning Aptitude and Skill Development of School Level*. Unpublished Paper Presentation at Brighter School's Price and Speech given Day.

National Policy on Education (2004). *Federal Republic of Nigeria.*

Hotat, M. (1998). *Managing Stress and Anxiety among School Children* Publisher Ltd.

Hussaini, A. (2003). *Analysis of Factors and Sequence on the Development of Neuroses among School Mathematics Students in Niger State.* Unpublished Paper on Anxiety and Mathematics Achievement of School Children pp. 2-8.

James, C. (2004). *The Study of Correlation on Influence of Science and Mathematics in Nasarawa State.* Journal of Mathematics Education Vol., 5.16-18.

Julius O. (2006). *Comparison of Young Children Mathematics Anxiety across Different Teaching Approaches.* Unpublished Med Thesis UniLorin.

Ken, D. (2005). *The Psychology of Learning Mathematics*. Yinka Group of Publisher 20-29.

Kolawalwe, B.F. (2007). Assessment of Factors Impeding Mathematics Learning in Primary Schools in Nigeria. Journal of Mathematics Education 2(1), 13-19.

Ladoke, U. (2006*). Assessing and Managing Students Crises Arising from Stress in Mathematics.* Journal of Mathematics Education 4(2), 18-22.

Mark, E. (1999). *Confusion in Mathematics Classrooms*. Palace Printing Press, Kaduna.

Nathaniel, U. (2005). *Identification of Psychological Factors Militating NPE*

*National Policy on Education 2004. Federal Republic of Nigeria, Against Students Performance in Mathematics*. Unpublished Med Thesis University of Jos. Lagos.

Nwosu, O. (2000). *Attitude, Interest and Anxiety as Factors Determining Students Achievement in Mathematics*. Educational Research Journal 2(1), 3-14.

Obodo, L. (1991). *Potential Generator of Interest for Mathematics Education.* Journal of Mathematics, Science and Technology, 2(5) 14-36.

Obodo, L. (2002). *Classroom Interaction Analysis of Primary School Mathematics Classes in Ogun. Report of Education Surveillance and Pupil's Achievement in Science and Mathematics*. Pg. 23-27.

Okebukola, P. A. (1982). *The Development of Validation of a Co-operative Learning Observation Schedule.* Ibadan, Adabaro Press.

Okeke, A. and Segun D. (2001). *An Investigation into Anxiety and Operational Steps taken by Anxious Pupils while Solving Mathematics*. Journal of Science Education 4(1) 20-23.

Olagbewo, L. (2003). *An Introduction to Child Psychology*. Publishing Company.

Oyenike J. (2006). *Information Technology and the Nigeria Society. Implication for National Development.* Journal of Science and Technology 3(1), 36-42

Sark, A. (2003). *Students Misconceptions Alternative Conceptions of Mathematics Concept. Implication for Mathematics Teachers*. Unpublished Thesis, Bayero University Kano.

Segun, E. (2006). *Problems of Mathematics Curriculum Development in Nigeria.* Journal of Nigeria Education Research Association 3(2), 50-59.

Shadow, F. (2002). *Restorative Learning Style for Disable Students. Jos*. Journal of Education Psychology 2(1) 13-32.

Spielberger, C.D. (1972). *Anxiety as an Emotional State.* New York, Academic Press., Vol. (2), 293-297.

Tole, C. (2006). *Psychology, Aspects of Human Development:* Ilorin Kewulere Publisher Ltd.

Tsado, D. (2005). *Mathematics Classroom Research. A Critique new Approach.* Journal of Mathematics Education. 5(2) 22- 24.

Vincent O. (2003). *Managing Stress and Anxiety among School Children in Nigeria.* Unpublished M.Ed Thesis UNIJOS, 12-46.

Wisker, F. (1989*). Effects of Psychoneuroses on Students Achievement in Mathematics.* Journal of Psychology and Educational Management. 3(1), 17-33.

## APPENDIX A

### ANXIETY MATHEMATICS QUESTIONNAIRES (AIMQ)

**INSTRUCTION:** Each of the statement on this scale expression a feeling towards mathematics. You are to indicate on a five point scale, the extent of agreement between the feelings expressed in each statement and your own personal feelings. The five points are;

| | (ABR) | (LKP) |
|---|---|---|
| Strongly Agree | (SA) | 5 |
| Agree | (A) | 4 |
| Undecided | (U) | 3 |
| Disagree | (D) | 2 |
| Strongly Disagree | (SD) | 1 |

Thick the letter or letters that gives the best indication of how you agree or disagree

| S/N | ITEM | SA | A | U | D | SD |
|---|---|---|---|---|---|---|
| 1 | I can never do well in mathematics | | | | | |
| 2 | Mathematics is simple and easy to learn. | | | | | |
| 3 | Mathematics teachers have poor methods of teaching mathematics. | | | | | |
| 4 | Mathematics is a compulsory subject in all fields of human learning. | | | | | |
| 5 | Mathematics language is not a problem to pupils in solving mathematical problems. | | | | | |
| 6 | Use of concrete objects do not remove the fears of teaching | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | some concepts in mathematics. | | | | | |
| 7 | Pupils use to develop fear in learning mathematics. | | | | | |
| 8 | I may not pass mathematics even though I read hard. | | | | | |
| 9 | My hand use to shake when I solve mathematics. | | | | | |
| 10 | Learning mathematics is better in small group than with large group of pupils. | | | | | |
| 11 | I feel disturb when it is time for mathematics lesson. | | | | | |
| 12 | Male pupils performed better in mathematics than their female counterparts. | | | | | |
| 13 | Mathematics is a subject for pupils who are gifted. | | | | | |
| 14 | Reward improve pupils' performance in mathematics. | | | | | |
| 15 | Learning mathematics require use of thinking. | | | | | |
| 16 | I feel disturb when solving mathematical problems. | | | | | |
| 17 | I use to run away from my mathematics teacher. | | | | | |
| 18 | Use of instructional materials helps in reducing heart beating during classroom instructions. | | | | | |
| 19 | I dislike mathematics in my life. | | | | | |
| 20 | Problem Solving Methods help me in understanding mathematics. | | | | | |

## APPENDIX B

MATHEMATICS ACHIEVEMENT TEST (MAT)

1. | 240 | + | 312 |

(a) 552 (b) 482 (c) 792 (d) 652

2. The product of 6 and 9 is

(a) 15 (b) 26 (c) 54 (d) 45

3. If the C.P of a book is N40 and the S.P is N48. Calculate the gain

(a) N8 (b) N88 (c) N168 (d) 186

4. a(x+y)

(a) ax + ay (b) ay + x (c) ax + y (d) ax-y

5. Subtract 1000 from 5500

(a) 6500 (b) 4500 (c) 5,500,000 (d) 45550

6. 5% of N200 is

(a) N10 (b) N20 (c) N25 (d) N15

7. ⅓+ ½ = ☐

(a) ⅝ (b) $^{6}/_{7}$ (c) $^{5}/_{6}$ (d) $^{4}/_{7}$

8. A triangle has ---------- sides

(a) 7 (b) 3 (c) 4 (d) 5

9. Calculate the area of a rectangle whose length is 4m and width 3m

(a) $12^2$ (b) $0.7m^2$ (c) $14m^2$ (d) $8m^2$

10. Octagon refers to object with ---------- sides

(a) 5 (b) 8 (c) 7 (d) 9

11. 144 ÷ 12-

    (a) 13 (b) 10 (c) 12 (d) 11

12. Find the differences between 10 and 2

    (a) 8 (b) 12 (c) 20 (d) 10

13. The product of 5 and 8 is divided by 10. What is the result?

    (a) 3 (b) 5 (c) 4 (d) 6

14. The area of a room is $30m^2$ if the length is 6m, calculate the width

    (a) 5m (b) 8m (c) 7m (d) 6m

15. The distance between two ---------- is refer to as a line

    (a) dot (b) arc (c) 180 (d) point

16. How many seconds are in 2 minutes?

    (a) 120 (b) 140 (c) 180 (d) 60

17. 0.25 + 1.375=

    (a) 1.625 (b) 1.735 (c) 1.0625 (d) 1.52

18. Calculate the mean of the set of number 20, 15, 25

    (a) 15 (b) 20 (c) 25 (d) 30

19. Determine the mode: 6,9,3,5,4,3,9,3,7.

    (a) 6 (b) 9 (c) 3 (d) 12

20. The square root of 256 is

    (a) 13 (b) 14 (c) 16 (d) 15

21. A coin is loss once. What is the probability of having a head?

    (a) ½ (b) ¼ (c) ⅓ (d) 1

22. Calculate the volume of a box with dimension 16cm, 10cm and 5cm respectively.

(a) $14cm^3$ (b) $800cm^3$ (c) $1200cm^3$ (d) $12cm^3$

23. | 256 | + | | = | 16 |

(a) 16 (b) 20 (c) 14 (d) 18

24. Calculate the total cost of three pencils at N2 each, 5 books at N10 each

(a) N58 (b) 56 (c) 53 (d) N54

25. Convert the fraction to decimal

(a) 0.4 (b) 0.6 (c) 0.2 (d) 0.3

26. Approximate 2490 to 2 significant figure

(a) 249 (b) 250 (c) 2000 (d) 250

27. Liquid is measured in

(a) litre (b) metre (c) gallon (d) gramme

28. Ado bought a car for N50,000 and after 10yrs, the car has depreciated by 20% of it initial cost. What is the new cost?

(a) 45,000 (b) 40,000 (c) 35,000 (d) 30

29. ---------- is an instrument used to measure body temperature

(a) Hygrometer (b) Barometer (c) Thermometer (d) Monometer

30. How many days are in one leap year?

(a) 366 (b) 355 (c) 358 (d) 350

ANSWER (MAT)

1. A
2. C
3. A
4. A
5. B
6. A
7. C
8. B
9. A
10. B
11. C
12. A
13. C
14. A
15. C
16. A
26. B
27. A
28. B
29. C
30. A

**Formula**

Mean square (msb) = $\frac{SSb}{Dfb}$

Mean square (msw) = $\frac{ssw}{Dfw}$

$F = \frac{msb}{Msw}$

$Ssbtw = \frac{(Ex)^2}{n_2} + \frac{(Ex^2)}{n_2} + {}^2\frac{(Ex3)}{n_3} - {}^2\frac{(Ex)^2}{N}$

SS within = ss Total – SSbtw

SS total = $Ex^2 - \frac{(Ex)^2}{N}$

$t = \frac{\bar{x}i - \bar{x}2}{\sqrt{\left\{\frac{(Ss1 + ss2)}{Ni+n2-2}\right\}\left\{\left(\frac{1}{n1} + \frac{1}{n_2}\right)\right\}}}$

Where n = number of items under each group $SS_1$ $SSss_2$ = standard deviation

$SS_1 = Ex_1^2 - (Ex1)^2$

$SS_2 = Ex^2 - \frac{(Ex^2)^2}{n2}$

## APPENDIX C1

### Zone A

x Pupils score in mathematics achievement test

| S/N | x | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 10 | 2. | 40 | 3. | 11 | 4. | 14 | 5. | 44 | 6. | 56 |
| 7. | 10 | 8. | 14 | 9. | 33 | 10. | 24 | 11. | 60 | 12. | 62 |
| 13. | 70 | 14. | 61 | 15. | 10 | 16. | 14 | 17. | 11 | 18. | 70 |
| 19. | 68 | 20. | 11 | 21. | 14 | 22. | 24 | 23. | 11 | 24. | 70 |
| 25. | 40 | 26. | 20 | 27. | 14 | 28. | 14 | 29. | 44 | 30. | 56 |
| 31. | 67 | 32. | 11 | 33. | 44 | 34. | 60 | 35. | 40 | 36. | 70 |
| 37. | 61 | 38. | 24 | 39. | 66 | 40. | 81 | 41. | 11 | 42. | 63 |
| 43. | 70 | 44. | 66 | 45. | 24 | 46. | 63 | 47. | 66 | 48. | 81 |
| 49. | 67 | 50. | 11 | 51. | 70 | 52. | 81 | 53. | 63. | 54. | 40 |
| 54. | 11 | 56. | 32 | 57. | 81 | 58. | 90 | 60. | 43 | 61. | 9 |
| 62. | 81 | 63. | 55 | 64. | 32 | 65. | 43 | 66. | 8 | 67. | 9 |
| 68. | 82 | 69. | 81 | 70. | 55 | 71. | 9 | 72. | 41 | 73. | 43 |
| 74. | 19 | 75. | 80 | 76. | 77 | 77. | 53 | 78. | 75 | 79. | 69 |
| 80. | 92 | 81. | 89 | 82. | 19 | 83. | 53 | 84. | 80 | 85. | 77 |
| 86. | 45 | 87. | 69. | 88. | 53 | 89. | 75 | 90. | 89 | | |

## APPENDIX C2

## Zone B

x Pupils score in mathematics achievement test

| S/N | x | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 44 | 2. | 33 | 3. | 62 | 4. | 61 | 5. | 44 | 6. | 10 |
| 7. | 56 | 8. | 14 | 9. | 60 | 10. | 61 | 11. | 11 | 12. | 40 |
| 13. | 14 | 14. | 62 | 15. | 44 | 16. | 11 | 17. | 68 | 18. | 11 |
| 19. | 61 | 20. | 40 | 21. | 24 | 22. | 70 | 23. | 11 | 24. | 14 |
| 25. | 70 | 26. | 14 | 27. | 11 | 28. | 70 | 29. | 56 | 30. | 56 |
| 31. | 64 | 32. | 67 | 33. | 11 | 34. | 40 | 35. | 53 | 36. | 64 |
| 37. | 24 | 38. | 14 | 39. | 40 | 40. | 33 | 41. | 60 | 42. | 40 |
| 43. | 14 | 44. | 52 | 45. | 58 | 46. | 14 | 47. | 67 | 48. | 32 |
| 49. | 43 | 50. | 66 | 51. | 8 | 52. | 9 | 53. | 41 | 54. | 77 |
| 55. | 45 | 56. | 53 | 57. | 69 | 58. | 19 | 60. | 45 | 61. | 77 |
| 62. | 75 | 63. | 11 | 64. | 81 | 65. | 24 | 66. | 8 | 67. | 43 |
| 68. | 9 | 69. | 45 | 70. | 10 | 71. | 19 | 72. | 45 | 73. | 53 |
| 74. | 19 | 75. | 75 | 76. | 45 | 77. | 11 | 78. | 24 | 79. | 14 |
| 80. | 14 | 81. | 33 | 82. | 11 | 83. | 66 | 84. | 40 | 85. | 43 |
| 86. | 45 | 87. | 69. | 88. | 55 | 89. | 75 | 90. | 50 | | |

## APPENDIX C3

## Zone C

x Pupils score in mathematics achievement test

| S/N | x | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 24 | 2. | 14 | 3. | 15 | 4. | 41 | 5. | 61 | 6. | 50 |
| 7. | 32 | 8. | 70 | 9. | 82 | 10. | 41 | 11. | 62 | 12. | 33 |
| 13. | 27 | 14. | 6119 | 15. | 65 | 16. | 55 | 17. | 45 | 18. | 11 |
| 19. | 15 | 20. | 29 | 21. | 30 | 22. | 43 | 23. | 45 | 24. | 30 |
| 25. | 19 | 26. | 41 | 27. | 90 | 28. | 24 | 29. | 71 | 30. | 57 |
| 31. | 53 | 32. | 24 | 33. | 50 | 34. | 71 | 35. | 10 | 36. | 11 |
| 37. | 22 | 38. | 55 | 39. | 41 | 40. | 25 | 41. | 80 | 42. | 40 |
| 43. | 52 | 44. | 19 | 45. | 53 | 46. | 44 | 47. | 33 | 48. | 24 |
| 49. | 60 | 50. | 46 | 51. | 50 | 52. | 41 | 53. | 25 | 54. | 42 |
| 55. | 55 | 56. | 34 | 57. | 22 | 58. | 71 | 60. | 25 | 61. | 35 |
| 62. | 34 | 63. | 32 | 64. | 48 | 65. | 55 | 66. | 23 | 67. | 19 |
| 68. | 11 | 69. | 25 | 70. | 67 | 71. | 16 | 72. | 18 | 73. | 10 |
| 74. | 33 | 75. | 44 | 76. | 12 | 77. | 11 | 78. | 16 | 79. | 60 |
| 80. | 68 | 81. | 62 | 82. | 57 | 83. | 60 | 84. | 55 | 85. | 71 |
| 86. | 22 | 87. | 46 | 88. | 32 | 89. | 19 | 90. | 66 | | |