RELATIVE EFFECTIVENESS OF SYSTEMATIC DESENSITIZATION AND SELF–MANAGEMENT TECHNIQUES ON MATHEMATICS ANXIETY AMONG PRIMARY SCHOOL PUPILS

By

OGUGUA, GLORY URU
REG NO 2010627003P

DEPARTMENT OF GUIDANCE AND COUNSELLING,

FACULTY OF EDUCATION,

NNAMDI AZIKIWE UNIVERSITY, AWKA.

AUGUST, 2016

TITLE PAGE

RELATIVE EFFECTIVENESS OF SYSTEMATIC DESENSITIZATION AND SELF–MANAGEMENT TECHNIQUES ON MATHEMATICS ANXIETY AMONG PRIMARY SCHOOL PUPILS IN DELTA STATE, NIGERIA

By

OGUGUA, GLORY URU
REG NO 2010627003P

A DISSERTATION PRESENTED TOTHE DEPARTMENT OF GUIDANCE AND COUNSELLING, FACULTY OF EDUCATION NNAMDI AZIKIWE UNIVERSITY, AWKA IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF A DOCTOR OF PHILOSOPHY DEGREE IN COUNSELLING PSYCHOLOGY.

AUGUST, 2016

CERTIFICATION PAGE

This is to certify that this research work was duly carried out by Ogugua Glory Uru with registration number 2010627003P, Department of Guidance and Counselling, Nnamdi Azikiwe University, Awka. That the work is mine except as specified in the acknowledgements and references, and that the dissertation submitted there in has not been submitted to this University or any other University for the award of a degree.

_____ _____

Ogugua Glory Uru Date

DEDICATION

This dissertation is dedicated to my loving husband H.R.M. Igwe John NwachukwuOgugua and my ever supportive children: Chinwe, Emeka, Chiamaka and Ekene, whose unflinching love and encouragement motivated me. Also, this work is dedicated to my late parents; Mr & Mrs Eseonu.

ACKNOWLEDGEMENTS

The researcher is indebted to several people for the successful completion of this work. First and foremost is Prof. M.A Anagbogu, her supervisor whose deep concern towards her academic well-being motivated and reinforced the researcher throughout this course of study. She went through several draft of this work which bears the stamp of her vast experience and incisive mind. It is obvious without her this work will not come up to this stage.

The researcher also wishes to express her gratitude to the Head of Department of Guidance and Counselling, Dr. A. Anyamene who read the work both at the proposal and faculty defence. Also, her words of encouragement assisted her all through this work. God bless you immensely.

The researcher is very appreciative of Dr. C. Nwokolo whom she constantly disturbed even at home to make vital contributions to the completion of this work. She remains grateful for her tolerance even at odd times. To Prof. C.A Nwankwo, she says a big thank you for his immense contribution and professional assistance in seeing to the logical conclusion of this work.

The researcher is also appreciative of Prof. K. R. E Okoye and Prof. J. Okafor who thoroughly read the initial presentation of the work and made objective contributions which enriched its quality. Also, the researcher appreciates Prof. Umeashiegbu, Prof. O. T. Ibeneme and Rev. Sr. Dr. A. Obineli whose impact to the researcher throughout the stay in the institution is unquantifiable.

Appreciation also goes to the head teachers, classroom teachers and pupils of the schools used for this study. Their wonderful cooperation helped in providing the needed useful information carried out in this study.

Finally, the researcher appreciates her husband H.R.M Igwe J.N. Ogugua, whose love, understanding and support both morally and financially contributed immensely to this achievement. Also grateful to her children: Chinwe, Emeka, Chiamaka and EkenOgugua and her caregiver Onyebuchi who wakes her up to study. God bless you all.

Above all, the researcher gives God the Glory for his unquantifiable love and immense protection from the beginning of this program till date.

TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

The present study was conducted to determine the relative effectiveness of systematic desensitization and self-management techniques on pupils' mathematics anxiety. Five research questions and five hypotheses guided the study. The study used a quasi-experimental design comprising three groups: Experimental I (Systematic Desensitization). Experimental II, (Self-Management) and, the control group (conventional counselling) by pre-test/post-test. The sample size consisted of one hundred and twenty five (125) primary five pupils drawn through purposeful sampling technique from three co-educational primary schools in Oshimili South Local Government Area of Delta State. Data were collected using a standardized instrument the 'Abbreviated Mathematics Anxiety Scale' (AMAS). The instrument had only nine items to suit the concentration span of the pupils and it was administered to both the experimental groups and control group before and after the experiments. The results from the instrument made up the pre-test and post-test scores. The data were analyzed using mean scores for research questions and the analysis of covariance (ANCOVA) was used in analyzing the data relating to the null hypotheses. The results of the study indicated that, systematic desensitization (SD) and self-management (SM) techniques had significant effects in reducing pupils' mathematics anxiety. That self-management technique was more effective in reducing mathematics anxiety of female pupils than in the male pupils. The result also revealed that systematic desensitization had equal effects in reducing mathematics anxiety on both male and female pupils. Generally, self-management technique was more effective in the reduction of mathematics anxiety of pupils. Based on the findings of the study, it behoves on guidance counsellors to begin early to counsel pupils on the use of systematic desensitization and self-management techniques in helping pupils reduce the anxiety they witness when learning mathematics and to the school counsellors it becomes imperative that these techniques are incorporated as strategies in helping pupils reduce their anxiety for mathematics.

CHAPTER ONE

INTRODUCTION

Background to the Study

Mathematics is one compulsory subject that has its foundation rooted in the academic life of every individual in the world, from the basic primary classes to the tertiary institutions. In Nigeria, mathematics is commonly known as one of the dreaded subjects amongst pupils and students because of the numerous figures involved in doing mathematics. This sometimes create shock , sweaty palms and even fast heart beat amongst others, causing these group of mathematics learners to exhibit anxiety towards the subject. In Delta State particularly, it has been an observable phenomenon amongst higher primary school pupils that mathematics figures are numerous, complicated and scary. As a result of this erroneous mind set, general pupils' performance in this regard has not been encouraging.

Over the years, there has been a consistent downward trend in the performance of pupils from Delta State in the subject mathematics. In the 2013/2014 academic year, only 21.23percent of the pupils obtained a credit pass in the common entrance examination organized by the National Examination council (NECO). This has largely been attributed to the mathematics anxiety some pupils witness which affects their level of relaxation, while learning the subject. The manifestation of this imbibed anxiety for mathematics is seen in such affected pupils who eventually make career choices in areas that have no connection with mathematics which invariably reduces the number of science subjects they are expected to explore in the scientific world of today.

According to Garry (2005), science exploration in the present modern society is related to mathematics and the subject mathematics is known particularly for its versatile connectivity

to different aspects of an individual's daily life dealings. This is also critical for individual's esteemed economic influence on scientific development in terms of levels of energy and productivity essential for living with minimal anxiety. As viewed by Obodo (2014), mathematics is termed as the pivot around which the whole essence of living revolves. It is the basic reason why the subject must be properly taught in the higher primary classes in such a way that, children imbibe the rudimentary basics needed in understanding the subject such as measurement.

In understanding mathematics according to Abiam and Odok (2006), its properties and relationships of quantities and sets have to be under-studied in terms of measurement, using numbers and symbols as it relates to many branches. These main branches are: Arithmetic, algebra, geometry, trigonometry, calculus and probability and these branches are studied in progressive forms according to their level of difficulty. Abiam and Odok (2006) further noted that, in the lower primary classes, children are carefully and systematically taught the importance of mathematics by placing so much emphasis in the foundation of arithmetic in stages of addition, subtraction, as well as identification of related mathematical materials, to aid easy understanding of the subject. Again, as children move to the higher primary classes up to primary five, they are introduced to a higher step of the basic mathematics concept, which includes the multiplication of numbers, divisions, elementary decimal, fractions, least common multiples (L.C.M), highest common factors (H.C.F) and simple word problems in mathematics.

In Nigeria, these early important mathematics concepts are compulsorily applicable in all schools. It is in recognition of the importance Nigeria placed on mathematics that the Federal Government of Nigeria in 2004 deemed it necessary to establish the National Mathematics Centre (NMC) Abuja, and the related institutions. The major objectives of these institutions

are; to improve on the teaching and learning of mathematics, reduce the anxiety children have for the subject and to develop interest of pupils/students in the study of mathematical sciences in the early stages of the educative life of the child. These in the long term it is hoped, will help the child understand and adopt the importance of the subject believing that it could be achieved through daily practical involvement in buying and selling which deals with figures. Also, pupils in primary five classes could apply these learnt concepts to other related scientifically related subjects. For example, these class of pupils could be asked to convert figures from degree Celsius or centigrade (℃) to degree Fahrenheit (℉) as it becomes relevant in physics, chemistry and the biological sciences. Okigbo and Osuafor (2008) relate this importance of mathematics to the scientific, industrial, technological and social progress of a society. Anih (2002) also opines that, no nation can make any meaningful achievement in economic development and technological growth, if strong mathematics foundation is lacking. He further emphasized that the importance placed on the learning of mathematics begins with children being taught the basic concept at the very early school age as pupils.

Despite the importance placed on mathematics, experience over time as opined by Adeyegbe (2000) has shown that, many pupils are not mathematics friendly. Generally however, most mathematics anxious pupils particularly in the higher primary classes tend to shy away from the subject due to some challenges they encounter in the course of solving mathematics problems. This includes lack of comprehending the concept of multiplication, division and basic algebraic techniques which are necessary in solving different aspects of mathematics problems at the primary five class level. These basic challenges create mathematics anxiety in the affected pupils who sometimes feign some form of sickness like; tommy ache or head-ache anytime mathematics is mentioned in a group setting or even when simple numbers are digitally expressed on the chalkboard. According to Obanya (2002), pupils' carrier choices in the long run are limited if their anxiety level in the subject is high.

The term anxiety to Ifeagwazi (2008) is defined as stress, tension and strain brought into one's body and mind as unpleasant emotion, characterised by terms like apprehension, worry, dread and fear which threatens the well-being of the individual. This is commonly experienced by all classes of persons in various degrees. Although the word anxiety appears to connote negative phenomenon to humans however, it has been established as stated by Ashcraft and Kirk (2001) that, 'moderate and occasional anxiety is known to be very common human experience and perhaps it serves very useful purpose in sparing individuals the activity in the face of dangers and threats. Nevertheless, it becomes worrisome when anxiety persists. Okoye (2006) opines that, any situation which persistently threatens the well-being of an individual is assumed to produce a state of anxiety marked by uneasiness which the individual cannot escape from. It is accompanied by feelings of helplessness because, the anxious person feels blocked and unable to find a solution to his problems.

In some instances, a good number of pupils in the higher primary classes tend to experience some level of anxiety during mathematics lessons or even when writing mathematics examinations. This becomes a problem when anxiety affects the pupils' level of assimilation of the taught concept and the overall performance of the pupils in the mathematics class. According to Obodo (2014), a pupils' level of assimilation in mathematics is sometimes relative to gender. He opines that, slight differences may be found concerning anxiety towards pupils' mathematics; where girls are believed to be more anxious than their male counterparts (Anchor, Imoko & Ajai, 2010). This in turn affects the pupils' assimilation level thereby causing high level of mathematics anxiety among them. Tobias (1976) discusses mathematics anxiety as being especially problematic for women. Anchor et al (2010) also noted large sex differences in University level mathematics courses where they confirmed that, females are disproportionately enrolled in basic mathematics courses and opined that,

female dropout rates from mathematics classes as a result of tension and apprehension they witness in the course of studying the subject almost double those for males. Put succinctly, mathematics anxiety according to Akinsola and Tella (2003) is the unpleasant feeling of apprehension, tension or fear.

This feeling of fear sometimes interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situation and can cause one to forget and lose one's self-confidence. Again, Ma and Xu (2009) view mathematics anxiety as an emotional situation relating to an individuals' inability to do mathematics, independent of skill and in higher primary pupils, it could cause neurotic difficulties in the long run, if it is left unattended to. In most cases, these emotional situations caused by mathematics anxiety could result in the pupil feeling sick, having a fast heart palpitation, dry mouth, in ability to speak or think clearly, a sense of detachment, dizziness and sometimes breathlessness.

Also, these symptoms can affect the concentration level of the pupil in a mathematics lesson so much so that, the pupils involved might find it difficult to understand the basic techniques used in solving simple mathematics problems. Amongst anxious pupils, a noticeable common phenomenon as observed by Okigbo and Osuafor (2008) is the unconscious sweating in the palms, trembling, fingers been bitten, fidgeting and even absent mindedness, when presented with complicated numbers on the board because, they do not possess the clue on how to solve the given problem. This creates anxiety in the pupil particularly when the pupil is made to realise that, mathematics is a subject that must be passed before admission into secondary school, is granted. Anagbogu (2004) supported this view in her assertion that sometimes, anxious mathematics pupils from both the public and private primary schools are found cheating during test periods, by asking their classmates who are less anxious to assist

them because they realise failure in the subject will deprive them of gaining admission into the secondary school of their choice.

Baloglu and Kocak (2003) noted that, although it is not clearly determined what factors make pupils feel anxious towards mathematics, some likely factors include friends, who sometimes say "mathematics is difficult to understand", parents who say to the children's hearing that, they see mathematics as highly complicated and teachers who may pass the bias to the pupils by making them believe that there is a connection between the marks they get in the mathematics class and self-confidence.

In trying to understand the reasons associated with the numerous problems attached to the smooth learning of mathematics therefore, Anih (2002) stated that, the pupils with high mathematics anxiety sometimes become ill when mathematics lesson are ongoing in the class, while some get carried away with constant negative thoughts. Sometimes mathematics anxious pupils could begin to see their peers as potential threat in the class drills, even on daily basis, some lose the appetite they have for food as a result of their anxiety for mathematics.

The effect is that such pupils receive lower grades in mathematics and mathematics-related courses in general. Anxiety also negatively affects the pupils' level of understanding in terms of skills involved in doing the subject mathematics. Ashcraft & Kirk (2001) also stated that, this group of mathematics anxious pupils exhibit physical and psychological symptoms such as muscle tension, head-aches, irregular heartbeats, shyness when asked questions in the presence of their class mates and sometimes they panic and fear amongst others and wish the subject can be avoided.

As opined by Stober and Pekrum (2004), this avoidance in turn can temporarily reduce the anxiety but not necessarily an adaptive way of coping with the condition. The consequence of anxiety in mathematics therefore is that it could generate some form of worry amongst concerned pupils to the extent that they might run away from mathematics lessons even when they are aware that mathematics is a core subject which cannot be avoided. On account of this, Umoru–Onuka (2004) believe that the long term effect it would have on the pupils would be that, they would receive lower grades in mathematics and other related subjects in general.

As a result of obvious effect of mathematics anxiety on pupils, the children concerned, might become emotionally derailed thereby inhibiting their level of academic potentials to a point where it could snowball into a lifelong phobia for mathematics and this could spread to other spheres of life. This emotional distortion caused by mathematics anxiety particularly in pupils, of higher primary classes, has created a lot of concern to the stakeholders in the education sector. The consequence is that, researchers on behaviourism over the years have been making concerted effort to find ways and means to reduce the level of anxiety witnessed by this group of children in mathematics and to understand the rudimentary basic concepts imbedded in the mathematics subject.

One particular view held by behaviourists such as Brink (2000) and Eyseck (1982) is that learning, deals with a change in external behaviour and that it is achieved through a large amount of repetition of desired actions and a strong belief of how an individual manages self on given tasks. This is in tune with the belief that, reward encourages good habits and that bad habits are reprimanded and discouraged. Some of these researchers of behaviourism such as Ivan Pavlov (1927), Joseph Wolpe (1973) and Sigmund Freud (1939), adopted such techniques as: Exposure therapy, anxiety reduction techniques, systematic desensitization,

self- management, modelling and positive reinforcement with the effort to reduce anxiety using behaviour modification techniques. These have been proven to reduce mathematics anxiety to a large extent. To buttress this belief, Moses and Daniel (2008) in a different study reported that, using 3 dimensional instructional model to supplement conventional teaching method produced students who embraced mathematics better than those who were only conventionally taught. This enhanced their performance and reduced the students' anxiety level in the learning of mathematics.

It is therefore common belief that, in the classroom, learning leads to a great deal of repetitive actions, step by step approach as well as practicality on the side of the pupils so that they understand how and why the technicalities in the subject are handled to help reduce anxiety, when faced with mathematical problems. Also, pupils at the primary five class were expected to apply some self-determinist principles such as self-study by using given examples in the text book, to aid the understanding of complicated mathematical problems. In trying to achieve this therefore, counsellors over the years have been trying to use different counselling behavioural techniques to assist in reducing the anxiety pupils feel when doing mathematics. Among such are systematic desensitization and self-management techniques.

Systematic desensitization (SD) and self-management (SM) techniques are behavioural techniques for reducing mathematics anxiety and have been used successfully to suit the purpose in times past. Therefore, a sound experimentally-controlled research using appropriate methodology is yet required using the two techniques to ascertain the numerous questions based on the relative effectiveness between them in reducing mathematics anxiety.

Systematic desensitization (SD) is a technique developed by Joseph Wolpe. It aims at the alleviation of maladaptive behaviour and involves pairing relaxation with imagining scenes depicting situations that the client indicates which caused the feeling of anxiety. The therapist

usually operates on the assumption that, if the client is taught to relax while imagining anxiety provoking scenes, he will feel less anxious and the real life situation will cause the client much less discomfort. This is based on the premise that relaxation and anxiety cannot be manifested simultaneously. For example, an individual who is presented with a mathematics test will likely feel anxious if not prepared but the same individual if he has learnt to relax while visualising self will be less anxious if the skills required to manage ones' self are taught. For some primary school pupils, mathematics anxiety creates depression. Therefore, if systematic desensitization therapy is applied, it could reduce or totally eliminate the persistent feeling of anxiety witnessed by such pupils.

Self-management technique on the other hand, has been known as an effective approach to improve classroom behaviour (Leone & Hall, 2003). The goal of this treatment technique is the modification of the thought process whereby an individual tries to understand his strength and weakness and assume responsibility for his own actions. It also involves joint formulation of goals by both counsellor and client. Some of the task which when involved is that, the client (in this case a pupil) could use such critical behaviour to monitor his own performance. Also, self-management technique can be separated based on the principles of contingency management and cognitive control strategies (Conway, 2005).

Pupils suffering from mathematics anxiety sometimes perceive they lack the capabilities and resources to excel in the subject as a result of self-doubt. However, self-management techniques could be used to reverse the trend.

Treatment based on the principles of contingency management highlights the correlation between behavioural response and their consequences. Strategies such as self-study, self-monitoring, self-analysis, self-reinforcement and self-punishment are examples of contingency-based self-management procedure (Leone & Hall, 2003). Also, cognitive based

self-management strategies in contrast emphasised the origin of a response. This is based on the principle that anxious individuals should examine their thought process that comes before a response is made. The rationale on which this treatment lies believes that behavioural self-control can be increased by enhancing specific, cognitive or meta cognitive skills, that are believed to underlie and promote impulse control (Furner & Berman, 2003). For the purpose of this study, the researcher adopted self-management techniques to determine if personal application by individuals will lead to the achievement of desired and acceptable behaviour among pupils towards mathematics anxiety.

Statement of the Problem

It is surprising that till date, many pupils seem scared of attempting mathematics in the class. While some appear absent minded when the lesson is going on, others pretentiously give flimsy excuses like tummy ache just to miss the mathematics class. This behaviour according to Fumer and Berman (2003), is attributed to mathematics anxiety which causes pupils' poor academic performance in the subject. The deteriorating mathematics performance caused by the pupils' anxiety for the subject, as evidenced in the yearly conducted common entrance examinations has been of great concern to education policy makers, classroom teachers, parents, guidance counsellors and the society at large. This is with particular reference to Oshimili South Local Government Area of Delta State where this study is carried out.

Mathematics anxiety has been attributed as the main reason the common entrance results witnessed a steady average decline of 1.7 % performance from 1979-2001. In Delta State particularly, the common entrance result for 2014/2015 published showed that, only 37.3% of 36,018 pupils who sat for the exams, scored above the required pass mark in mathematics which is not encouraging too. Furthermore, the regular class performance in mathematics year result analysis between 2010 - 2013 Appendices H- J, collated from the three schools

sampled showed that a steady decline in the pupils' mathematics performance is attributed to the pupils' mathematics anxiety. For the period in question, none of the schools recorded above 11% pass in their mathematics continuous assessments and examinations. This is really worrisome and must be addressed if Nigerian younger generation must be equated at par with their counterparts in the global science world of today.

A holistic look at what is obtainable in primary schools' scheme of work in terms of mathematics lessons shows that, mathematics is a compulsory subject and a must pass subject for pupils gaining admission into secondary school. Also, mathematics is apportioned more time in the schools' time table because of its relative complexity. Based on this, teachers are compelled to give pupils the rudimentary basic step-by-step approach to assist them understand the subject easily. Even so, teachers of mathematics are subjected to attend seminars and workshops by Ministry of Education to enable them sharpen their skills on how best to approach the methodology in teaching the subject. Despite all these effort, pupils still possess heightened anxiety which affects their mathematics understanding and overall performance in the subject.

A good number of researchers such as Fajemidagba (1990) Ukeje (1986) Habor-Peters (2000) and Aguele (2004) have in time past, investigated the relative effectiveness of different psychological techniques on mathematics anxiety, as possible means to reduce the anxiety faced by pupils but, the problem still persists. This has been a source of worry to parent, teachers, researchers, counsellors, curriculum planners and even the pupils themselves.

The researcher as a guidance counsellor is worried about the anxiety pupils exhibit for mathematics and concerned about the negative effect this would have for the pupils in terms of the carrier choice they would be faced to make in the future, knowing that Delta State is an oil producing State and mathematics is a prerequisite to studying the needed science courses

which could help the pupils start a foundation in the science subjects that would easily help them in terms of gainful employment. Besides, many parents of these anxious pupils visit her office with series of problems concerning their children's anxiety behaviour for mathematics which hinders their performance.

Based on these, the researcher concluded that the problem created by mathematics anxiety among the affected pupils could be solved. This has been her motivating force to seek practical approaches to the pupils' problem (solving mathematics in a more relaxed state and doing mathematics by them-selves) using Systematic Desensitization (SD) and Self-Management (SM) techniques. It is believed that when this is successfully implemented, mathematics anxiety among the pupils will be reduced thereby enhancing their performance in the subject.

The study therefore is conducted to determine the relative effectiveness of Systematic Desensitization and Self-Management techniques on mathematics anxiety behaviour among primary school pupils. As at the time of this study, the researcher was not aware of any study that sought to determine the relative effectiveness of systematic desensitization and self-management techniques on mathematics anxiety behaviour in Oshimili South Local Government Area of Delta State. Based on this premise, the study was necessitated.

Purpose of the Study

The purpose of this study is to determine the relative effectiveness of systematic desensitization and self-management techniques on mathematics anxiety among higher primary education classes in Oshimili South Local Government Area, Delta State.

Specifically, the study seeks to determine:

1. The effect of systematic desensitization on mathematics anxiety among higher primary classes.

2. The effect of self-management technique on mathematics anxiety among higher primary classes.
3. The differences in the relative effectiveness of systematic desensitization and self-management counselling techniques on mathematics anxiety among higher primary classes.
4. The effect of systematic desensitization technique on male and female pupils' mathematics anxiety.
5. The effect of self-management instructional technique on male and female pupils' mathematics anxiety.

Significance of the Study

This work is expected to benefit all stakeholders in the education sector. They include but are not limited to the following: Pupils, school managers, classroom teachers, guidance counsellors, parents, policy makers, curriculum planners, researchers, Government as well as the society.

Pupils are the main target in this study hence, it is expected that through the techniques used to reduce anxiety, the pupils will absorb, process and retain the necessary skills relevant in understanding mathematics. The pupils will be motivated to practice the steps involved in reducing mathematics anxiety such as imaging the scene in the mathematics class and understanding the need to relax each time mathematics problems, are presented on the board. The pupils through this measure will be able to dialogue among themselves and form study groups particularly during break periods and, pupils will be made to think for themselves through learning and acquisition of skills, from the school counsellor, the classroom teachers and other allied professionals in reducing their mathematics anxiety.

Pupils will also benefit specifically as this study will help them become more mathematics friendly as it is expected that pupils will become confident to practice some mathematics problems on their own. If the findings show that systematic desensitisation instructional technique is effective in reducing mathematics anxiety among pupils, it is possible that many more pupils would wish to participate actively in mathematics classes when they employ such technique for instruction. In the long run, the pupils' anxiety in mathematics will be reduced.

The findings of this study will be relevant to school managers. Suppose the findings reveal to the school managers some of the negative consequences mathematics anxiety could pose on the affected pupils in the higher primary classes, school managers will thus understand what hinders pupils' performance in the subject at the higher level of their academic pursuit. The understanding will encourage the school managers to instruct the teachers to identify the mathematics anxious pupils in their various classes; encourage the school counsellors to become better trained in the management of anxiety at the primary school level. This will put the counsellors in positions where they would avoid words that could trigger anxiety in the pupils thereby, helping the pupils to maintain their mental energy level when doing mathematics.

The findings of this study will be beneficial to the classroom teachers. It will enable the classroom teachers to share observation of the pupil's mathematics profile and discuss where the breakdown is occurring for example: If systematic desensitization and self-management techniques are found to reduce the anxiety pupils witness while doing mathematics, a good majority of classroom teachers will want to use the techniques to help pupils reduce the anxiety they encounter in mathematics classes. It will give an in-sight to the class teachers on the level of worries and concerns pupils witness while doing mathematics, particularly in sub

skills, such as multiplication facts, division procedures or when pupils face difficulties in memory language, attention, sequencing, spatial ordering or higher order cognition which seems to affect pupil's mathematics skills that could create mathematics anxiety.

It is also hoped that the findings will expose teachers to learning strategy which if employed will reduce pupils' anxiety at mathematics and enhance their performance on the subject. Teachers will subsequently introduce the step-by-step approach involved in solving mathematics problems to the pupils whereby the pupils will be in full control of their learning activities while the teachers moderate. When a teacher is informed, effective measures will be taken to remediate the situation for the pupils' long term benefit.

The findings of this study will be beneficial to parents of mathematics anxious pupils. Parents will use the techniques of systematic desensitization and self-management techniques to ensure that their affected children learn to imagine the scenes involved in each step of the mathematics task and therefore encourage them to relax before attempting the mathematics problems. Through this practice, parents will know the importance of reassuring pupils that by consistent practice in mathematics, the anxiety witnessed will be reduced or totally eliminated.

Also parents will emphasize optimism by helping the pupils realize they can improve in their mathematics homework, by working on their weaknesses and make their strengths in the subject stronger. Parents will also benefit through the findings of this study because they will be in the position to help children build a sense of control over their home learning in mathematics by encouraging them to be accountable for their own progress. For example, a child who has difficulty remembering multiple steps in solving a mathematics problem can be encouraged by the parent to imbibe sub-vocalize strategies to organize and guide his or her efforts as this will help to build confidence in the pupil.

The findings will be beneficial to parents because, it will help them to use the techniques (systematic desensitization and self-management) techniques to manage their children/wards mathematics lesson and assignments thereby, reducing their worries and the burden they face in regularly searching for a private mathematics lesson teacher to enhance pupils' performance in the subject. With parents fully informed, they will enhance self-confidence in such pupils. Also, parents would align their children's thought process in the areas of self-study and self-analysis to their mathematics study periods and would desist from derogatory remarks commonly made to children who refuse to practice their mathematics as a result of anxiety for the subject.

Counsellors are professionals who are in the best position to instil some self-management and systematic desensitization techniques to the pupils. The findings of this study will enable the counsellors to properly use the learnt techniques so as to enhance the pupils' mathematics prowess and to note how frequently such behaviours occur amongst pupils so that, appropriate measures to curb or eliminate their anxiety state will be designed. The findings will assist the counsellors in making proper self-analysis in detecting the strengths and weaknesses of the pupils by observing the pupils during the mathematics class. With counsellors in-depth knowledge of the detrimental effect mathematics anxiety poses on the pupils, they will use behavioural workable techniques such as systematic desensitization, self-management and reinforcement techniques in helping to reduce mathematics anxiety of the concerned pupils and also find ways to assist the teachers, pupils and parents.

The Government and policy makers through the findings of this study could gain an insight that would make them see the importance of retraining teachers in the application of systematic desensitization and self-management techniques in mathematics lessons. In this

wise, the result will guide the government in the making education policies concerning the teaching, learning and anxiety reduction in mathematics.

Scope of the Study

The study was de-limited to pupils with mathematics anxiety in co-educational schools in Asaba. Specifically, the study focused on the effects of systematic desensitization and self-management techniques on mathematics anxiety among primary five pupils in schools in Oshimili South Local Government Area of Delta State.

Research Questions

The following research questions guided the study.

1. What is the effect of systematic desensitisation counselling technique on mathematics anxiety among primary school pupils when compared with conventional method using differences between pre-test and post-test mean scores?
2. What is the effect of self-management counselling technique on mathematics anxiety among primary school pupils when compared with conventional method using differences between pre-test and post-test mean scores?
3. What is the difference in the relative effectiveness of systematic desensitisation technique when compared to self-management technique using pre-test and post-test mathematics anxiety mean scores?
4. What is the effect of systematic desensitisation counselling technique on mathematics anxiety among male and female pupils using differences in pre-test and post-test mean scores?
5. What is the effect of self-management counselling technique on mathematics anxiety among male and female pupils using differences in pre-test and post-test mean scores?

Hypotheses

The following null hypotheses were stated and tested at 0.05 level of significance:

1. There is no significant difference in the pre-test and post-test mathematics anxiety mean scores of pupils treated with systematic desensitization technique and those in the control group.
2. There is no significant difference in the pre-test and post-test mathematics anxiety mean scores of pupils treated with self-management technique and those in the control group
3. There is no significant difference in the pre-test and post-test mathematics anxiety mean scores of pupils treated with systematic desensitization technique and those treated with self-management techniques.
4. There is no significant difference in the pre-test and post-test mathematics anxiety mean scores of male and female pupils treated with systematic desensitization technique.
5. There is no significant difference in the pre-test and post-test mathematics mean scores of male and female pupils treated with self- management technique.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter reviewed some related literature to the study. The review was presented under the following sub-headings:

Conceptual Definitions

Mathematics

Anxiety

Mathematics Anxiety

Systematic desensitization

Self-Management

Theoretical Framework

State -Trait theory on Anxiety by Speilberg

Respondent conditioning theory by Pavlov

Social Learning theory by Albert Bandura

Self-determination theory by Ryan and Deci

Theoretical Studies

Anxiety

Reducing mathematics anxiety

Systematic desensitization

Self-management

Related Empirical Studies

Mathematics Anxiety

Systematic Desensitization technique

Self-management technique

Summary of Review of Related Literature

Conceptual definition

The definitions and explanations of relevant concepts are presented as follows:

Mathematics

Mathematics definitions vary widely based on different schools of thought. The most prominent scholar of all times and great Philosopher Aristotle in the early 15th century, defined mathematics simply as the step-by-step approach in dealing with the study of numbers, structures, space and change. Based on the step-by-step approach guarding the principles of mathematics, Dotun (2005) defined mathematics as the study of the measurement of properties and relationships of quantities and sets, using numbers and symbols.

According to Cox (2007), mathematics is defined as the science of numbers, quantities, shapes and relations between them. Ukeje (1986) defined mathematics as the systematic and concise description of numbers with constant branches as algebra and geometry. He stated further that, Mathematics is the study of patterns which can be used to formulate new conjectures and create quantities that can provide insight and prediction about nature.

In relation to this work however, the meaning of mathematics as understood by children in primary schools generally, is the ability to use digits for different values in terms of its contribution to simplify and more efficient methods of calculation. This includes addition, subtraction, multiplication and division.

Anxiety

Anxiety is generally defined as a state of apprehension and worry which impairs normal functioning and is marked by recurrent discreet episodes or attacks of extremely intense fear and dread. Some behavioural psychologists have defined anxiety in different forms. Albert Ellis (2009) defined anxiety simply as a feeling of worry and uneasiness which is generally characterised and unfocused as an overreaction to a situation that is only subjectively seen as menacing. The root meaning to the word anxiety according to Ellis is to "vex or trouble", in either presence or absence of psychological stress. The adjective form which is to be anxious is a person's state of feeling worried or apprehensive over something or somebody.

He opined that anxiety can create feelings of fear, worry, uneasiness or dread and is associated with feelings of restlessness, fatigue, concentration problems as well as muscle tension. Freedman (2013) defined anxiety as emotion characterised by an unpleasant state of inner turmoil, which is often accompanied by nervous behaviour. He further stated that anxiety is a subjectively unpleasant feeling of dread over anticipated events, such as the feeling of failure in mathematics even before the exam begins. Tolin (2012), on the other hand, viewed anxiety as worry or overreaction to a situation that is only perceived as menacing. He further emphasized that, it is subjective to psychological and physiological states, characterized by somatic, emotional, cognitive and behavioural components and viewed as the displeasing feeling of fear and concern.

It is generally believed by psychologists that anxiety is one of mankind's highest ideals and, it is rampant in contemporary society that our time has been called the "Age of Anxiety". Though it is also believed that moderate and occasional anxiety is a very common human experience, it perhaps serves as a useful purpose in sparing us the anxiety in the face of dangers and threats in human life.

According to Mahmood and Khatoon (2011), life with anxiety is such a common life experience that dangerous situations are encountered which sometimes could create emotional problems when it becomes intense and persist. Weiner (2003), defined anxiety as a complex and variable pattern of behaviour, manifested in verbal reports of subjective experience, physiological reactions and effects of performance. He further stated that anxiety is known to have a two-part status. This he based on Freud's reference to anxiety as 'neurotic and objective'. The renowned psychotherapist Sigmund Freud stated that, in early childhood development, anxiety is regarded as residue of childhood memories of dependency which affects the individual's adult life. These results as humans learn during their first year of life that they are not self-sufficient and that their basic survival depends on the care of others. It is thought that this early experience of helplessness underlies the most common anxieties of adult life including fear of powerlessness and fear of being unloved. Thus, growing children according to Ibe (2008), can be made anxious by symbolic threats to their sense of competence and/or by significant relationship even though they are no longer helpless children.

In the view of McDonald (2001), anxiety is first of all a state of apprehension and concern of uneasiness. It is a special kind of fear. While ordinary fear always has an object or no object at all. Sharma (2002), defined anxiety as "Vague fear." He explained that anxiety prevails when a person is at odds with himself and it can be defined in general terms as a persisting distressful psychological state, arising from an inner conflict. Sometimes, the distress may be experienced as a feeling of being on edge, as any of a variety of other feelings, such as anger, fear, restlessness, depression, irritability or other diffused and nameless feelings.

The term anxiety according to Egbochukwu, Obodo and Obadan (2008) is simply a multi-system response to a perceived threat or danger. Smith (2004), who is an apostle of the

existentialist approach, defined anxiety as a conflict between "I might, I will and I'm responsible for this". Thus, anxiety to Gale and Davidson (2007) is related to decision, commitment, choice and awareness. Put succinctly by Tolin (2012), anxiety can be located in the gap that exists between comprehension of possibility and the choice that leads to its actualization. Strumpf and Fodor (2003) defined anxiety as a threat: This time, not to the personality but, to the self-concept. He traced anxiety to discrepancies between the self as conceived by the individual and his perception of reality.

Busari and Osiki (2001) postulated that, anxiety is an emotional state with its own set of characteristics. He stated categorically that, the term anxiety is perhaps most commonly used in contemporary psychology to denote a palpable but transitory emotional state or condition characterized by feelings of tension and apprehension as well as heightened autonomic nerves system.

Often times, anxiety is grouped with other emotions particularly with fear and it is most times used interchangeably as evidenced in the work of Cassady and Johnson (2002). Adeola and Adedipe (2003) observed that, anxiety manifests itself differently from other emotions in terms of gesture, posture, performance of interpersonal skills and even voice quality. In elaborating the meaning of anxiety, Cherry (2012) found out that in using factor analysis, the measures of fear, factors out separately from anxiety measures. This has been further highlighted by Ellis (2009) who believed that, disintegration of the personality or threat to existence of a person is the cause of anxiety. Although in his analysis, he stated that anxiety is a developmental stage in the emergence of fear. He also stated that in reacting to threatening stimuli; people are first startled, and then become anxious not knowing what to do.

For example, if a child of primary school age is not conversant with some basic necessary Mathematical formulae and is told entrance examination will be written in a few weeks' time and that mathematics is a compulsory subject that must be passed to enable any pupil gain admission into college, the child's first reaction would be instant shock and fear followed by anxiety which would likely set in unconsciously. Thus, Brink (2008) differentiates between anxiety, treat and fear, one being a stage before the other.

Ashcraft and Kirk (2001) stated that anxiety occurs when there is an appraisal of threat, but whose source is unidentifiable and so no clear action can be taken even when the diffuse and uneasy reaction associated with it occurs. This is probably why he stated that anxiety is a threat reaction particularly those reactions resulting from incomplete appraisal of the threat situation". Specifically, anxiety according to Freud as noted/highlighted by Anagbogu (2004) is caused by failure to assimilate precepts.

The argument is that, man in his process of development obtains new precepts and assimilates this into his perceptual system. For him to remain alright, the rate of assimilation must be at par with the intake of this new precept. If the rate of assimilation does not keep pace with intake, surplus of the assimilated precepts accumulate and generate anxiety.

Generally, anxiety is viewed as a psychological and physiological condition that includes various components such as (behavioural, cognitive, emotional and genetic/semantic), which merge and result in feelings such as nervousness, panic and discomfort. Anxiety can also be categorized as being state or trait, depending on the duration. Anxiety means the state of being nervous or worried that something bad is going to happen. It could be acute, intense or deep anxiety. The adjective form which is to be anxious is a person's state of feeling worried or apprehensive over something or somebody. Anxiety prevails when a person is at odds with himself and it can be defined in general terms as a persisting distressful psychological state,

arising from an inner conflict. Sometimes, the distress may be experienced as a feeling of being on edge, as any of a variety of other feelings, such as anger, fear, restlessness, depression, irritability or other diffused and nameless feelings. Scott (2012) defined anxiety as a complex and variable pattern of behaviour manifested in verbal reports of subjective experience, physiological reactions and effects of performance. Scott added that anxiety is known to have a two-part status.

This he based on Freud's reference to anxiety as 'neurotic and objective'. Freud stated that in early childhood development, anxiety is regarded as residue of childhood memories of dependency which affect the individual's adult life.

This results as humans learn during their first year of life that they are not self-sufficient and that their basic survival depends on the care of others. It is thought that this early experience of helplessness underlies the most common anxieties of adult life including fear of powerlessness and fear of being unloved. Thus, growing children according to Ibe (2008) can be made anxious by symbolic threats to their sense of competence and by significant relationship even though they are no longer helpless children.

In the view of Akca (2011), anxiety is first of all a state of apprehension and concern of uneasiness. It is a special kind of fear. While ordinary fear always has an object or no object at all. Segool (2009) defined anxiety as 'vague fear'. The term anxiety according to Zeidner (2004) is simply a multi-system response to a perceived threat or danger. Anxiety to Miller and Bichsel (2004) is related to decision, commitment, choice and awareness. Put succinctly by Thissen and wainer (2001), anxiety can be located in the gap that exists between comprehension of possibility and the choice that leads to its actualization. Scott (2012) postulated that anxiety is an emotional state with its own set of characteristics. Scott stated categorically that the term anxiety is perhaps most commonly used in contemporary psychology to denote a palpable but transitory emotional state or condition characterized by

feelings of tension and apprehension as well as heightened autonomic nerves system. Often times, anxiety is grouped with other emotions particularly fear with which it is sometimes used interchangeably as evidenced in the work of Strumpf and Foder (2003).

Anxiety can also be categorized as being a state or trait depending on the duration. At some point in one's life, the affective condition described as anxiety is experienced, which is why, the scope and dimension of anxiety is seen as having gradually crept into all facets of human functioning.

In relation to this study, anxiety is viewed as a psychological and physiological condition that includes various components (behavioural, cognitive, emotional and genetic/semantic). These components merge and result in feelings such as nervousness panic and discomfort felt by pupils who see mathematics as a difficult subject, particularly when taught in class.

Mathematics Anxiety

There are numerous descriptions on mathematics anxiety and each victim may have his own description. Hopko, McNeil, Lejuez, Ashcraft, Eifert, and Reil (2003) defined mathematic anxiety as involving feelings of tension and anxiety that interferes with the manipulation of numbers and the solving of mathematics problems. As such, mathematics anxious pupils experience physical, physiological and psychological feelings. Such physical feelings include sweaty palms, clenched fists, queasy stomach, dry mouth, heart palpitation, tension, headache etc. (Scott 2012). While the physiological feelings include panic, tension, helplessness, fear, distress, paralysis of the mind leading to mental disorganization, shame and the inability to cope when they are required to solve mathematical problems.

Pupils who experience these symptoms when in a mathematics class are termed to be mathematics anxious. Such pupils would need the help of experienced psychologists and counsellors who are trained in adopting various techniques and instruments to assess them

and apply the appropriate skills used to measure and to reduce the feelings of anxiety which the pupils might face when presented with figures and symbols known as mathematics.

Psychologists Richardson and Suinn (1972) developed the first instrument designed specifically to measure mathematics anxiety known as Mathematics Anxiety Rating Scale (MARS). They defined mathematics anxiety as the "feelings of tension and fear that interfere with the manipulation of numbers and the solving of ordinary life and academic situations". Apart from the physiological and psychological perspective, Ma and Xu (2009) highlighted two components of mathematics anxiety which are the emotional and cognitive components. The emotional component interferes with a person's ability to learn Mathematics, which later results in an intellectual problem. This includes nervous tension and discomfort when doing mathematics. Ashcraft et al 2009 stated that mathematics anxiety is an emotion that blocks a person's reasoning ability when confronted with a mathematical situation. Obodo (2014) defined mathematics anxiety as an emotional reaction to mathematics, based on past unpleasant experience which harms future learning. The cognitive component includes concerns for under performance, self-doubt, lack of confidence and negative attitude towards the subject mathematics. These consequences of mathematics anxiety therefore includes, lower mathematics achievement, the avoidance of taking mathematics course, negative attitude towards mathematics and less self-confidence in doing mathematics

Mathematics anxiety when witnessed by individuals sometimes leads to the outcome of low self-esteem hence the fear of failure is established in the individual. This causes problems for processing the incoming information as well as the previously learned information for problem solving. As such, it creates reasons why pupils for example, who are aware that the key to mathematics success is in understanding the rules guiding the solving of mathematics problems, sometimes are agitated and anxious when they lack the basic concepts required to

solve the mathematics problem. It is expected that such pupils are encouraged through the use of different counselling techniques to ease the anxiety they witness when mathematics lessons are on-going in the class. In the long run, this set of pupils embrace the subject even when it is applied in other related subjects and self-esteem of such pupils is increased particularly in the mathematics class.

The Cyclical Nature of Mathematics Anxiety

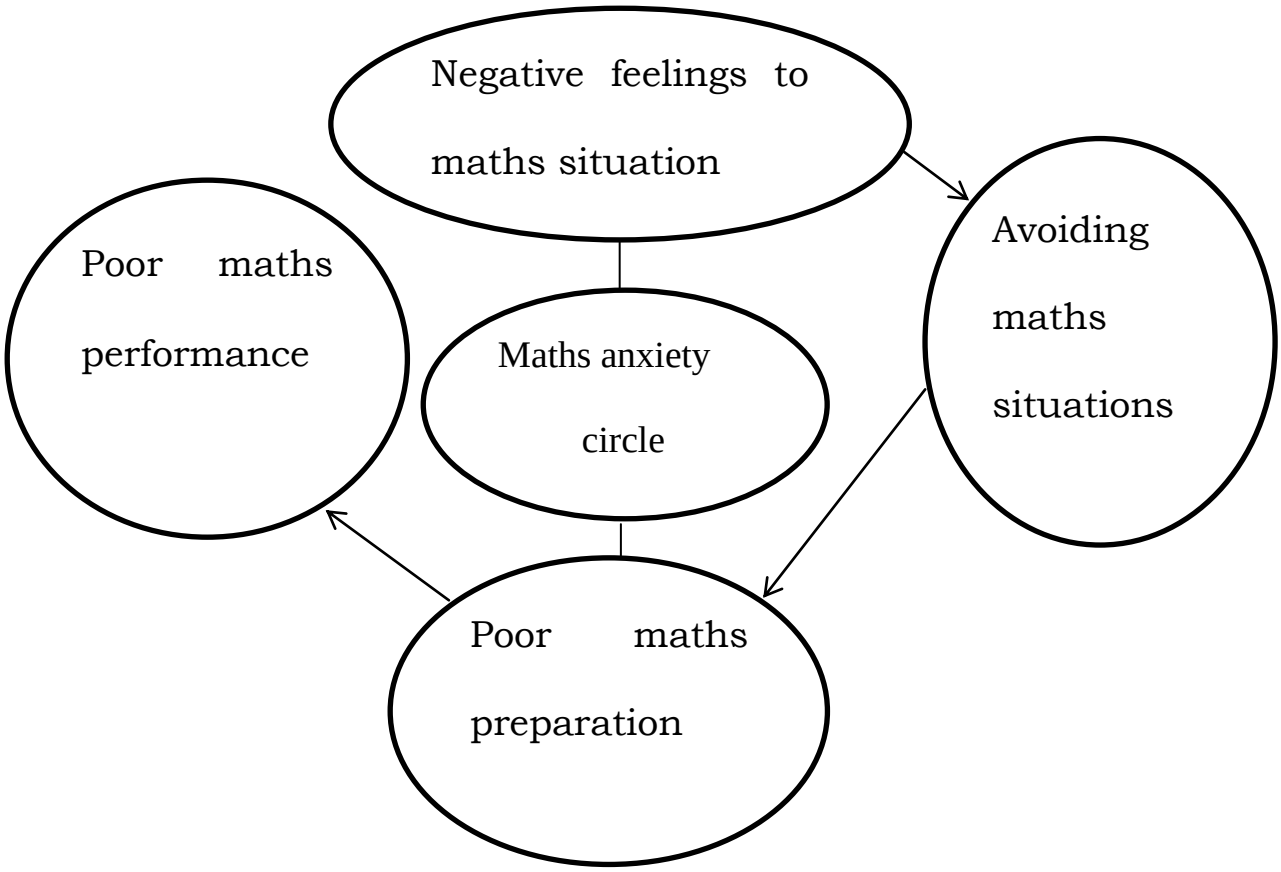


Fig. I

Systematic Desensitization

The term systematic desensitization in psychology is defined as therapy that is aimed at removing or diminishing the feared response of a phobia, and substituting it to a relaxation response to the conditioned stimulus, gradually using counter conditioning. According to Dubord (2011), systematic desensitization is a behaviour modification therapy that involves the use of classical conditioning methods in relaxing an individual who is anxious. It is a kind of counter conditioning whereby, an established habit could be weakened or upset by learning something else. The goal is to get the feeling of relaxation to dominate over the feeling of fear and anxiety for certain critical situation in a person's life.

McLeod (2008) in his own terms defined systematic desensitization as a type of behavioural therapy based on the principle of classical conditioning which was developed by Wolpe during the 1950s. He explained that, it is a therapeutic intervention skill that reduces the learned link between anxiety and objects or situations that are typically fear producing. He further stated that it is aimed at reducing or totally eliminating the fears that those suffering view as distressing which prevents them from functioning properly in their daily dealings.

During this treatment, the phobic person is asked to imagine the events that cause anxiety while engaging in a series of relaxation exercises. Over time, the person becomes desensitized to the anxiety-provoking event. After treatment, he /she will usually face the feared event with less anxiety. In that way, new behaviours would have been learnt. Oliha and Audu (2012) supported this view by stating that, systematic desensitization is a procedure by which new behaviours are learned in response to stimuli that previously elicited other behaviours through strategies like Information giving, relaxation training, establishment of hierarchies and counter-conditioning procedures.

In simple terms, systematic desensitization is the step-by-step approach followed in reducing the provocative symptoms intervention and a technique in treating phobias and other extreme

and erroneous fears which are based on the principles of behaviour modification. According to Duffy (2011), systematic desensitization is defined as a form of phobic treatment in which the client is taught the skills of relaxation and then given the opportunity to practice the learnt skills through gradual introduction to the feared object or situation. The technique is used as a part of cognitive behavioural therapy program.

Based on this premise, Fritscher (2009) as regards behaviour defined systematic desensitization as a type of behaviour therapy based on the principle of classical conditioning. Whereby, the learnt link between anxiety and the objects or situations that are usually producing the anxious feelings during mathematics tests are reduced.

For the purpose of this study, systematic desensitization is defined as a form of mathematics anxiety treatment whereby, through gradual introduction to the feared stimuli, the pupils are given the opportunity to practise the skills of relaxation and imagination to reduce the anxiety they feel when presented with figures and symbols which are characteristics of mathematics. This is expected will probably dominate over the feeling of fear and anxiety for certain critical situation in the pupils' life through processes which will ameliorate the pupils' level of anxiety.

The process consists of describing situations which are increasingly anxiety producing and creating an anxiety hierarchy to help such clients achieve relaxation. If in a deep state of relaxation a client is made to practice the scenes hierarchically until he/she is able to visualize the most stressful scene on the list without anxiety and deal with it, only when this is accomplished, that the therapist can say the goal systematic desensitization is achieved.

In Wolpes' (1982) opinion, the step-by-step technique of systematic desensitization can be explained thus:

(i) Training in deep muscle relaxation.

(ii) The establishment of a scale of subjective units of disturbance.

(iii) The construction of anxiety/fear hierarchies.

(iv) Counter-posing relaxation and anxiety by presenting stimuli from the hierarchies while the subject is relaxed.

Training in relaxation, followed the same process outlined by Jacobson. It takes six interviews with one lesson per interview instead of longer sessions of two-fifteen minutes' periods a day.

Step 1 -- Explanation of the rationale behind the therapy that neurotic behaviour is learnt and can be unlearned through relaxation of body muscles. For example: anxious higher primary school pupil preparing for the common entrance examination will be told that there is a definite relationship between the extent of muscle relaxation and the production of emotional changes opposing fear, and that muscles are tensed when fearful but, to inhibit fear, muscles ought to be relaxed and these muscles exercised are the biceps and the triceps as well as the muscles of the fore arms.

Step II --- Training in the relaxation of muscles of the head.

This is important because, most important muscles of the body are situated in and around the head in particular, as well as the muscles of the fore-head.

Step III--- Training in the relaxation of the muscles of the Jaw.

Step IV--- Training in the relaxation the muscles of the neck and shoulder.

Step V --- Training in the relaxation of the muscles of the back, thorax and abdomen.

Step IV --- Training in the relaxation of the lower limbs.

The degree of relaxation is then assessed by pupil's verbal reports on the degree of calmness that relaxation brings about in him, and the impression gained by the therapist while observing the client(s). The subjective fear scale is used for assessment. If these steps are

carefully adopted, pupils in primary five who are mathematics anxious will regain confidence in them and embrace the subject with reasonable ease.

Self-Management

Self can simply be defined as ones identity. According to Kenrick, Li and Butner (2003), the psychology of self is the study of either the cognitive, conative or affective representation of ones identity or the subject of experience. The earliest formulation of self in modern psychology is derived from the distinction between the self as I, the subjective knower and the self as me which is the object that is known, Conway (2005). Again, the philosophers who propagated the concept seek to describe those essential qualities in an individual that constitutes a person's uniqueness or essential being.

Probably, the best account of the origin of self-hood is that the self, comes into being at the interface between the inner biological processes of the human body and the socio-cultural network to which the person belongs. This could be the reason why Anagbogu (2004) believes that, all parts of the self, enable people to alter, change, add and modify aspects of them in order to gain acceptance even amongst school children in society. The self has many facets that help make up integral parts which are managed by the self.

The word management according to Ryan and Deci (2000) literally means a process of dealing with or controlling things or people despites difficulties or regulations. It can also be defined as a process of getting activities completed effectively and efficiently with people and through people. On functional basis, one views management as an act of making people more effective than they would have been without assistance. In business terminology, management is defined as the function that coordinates the effort of people to accomplish goals and objectives by using available resources. From the perspective of Schlenker and

Pontari (2000), management is considered to consist of four functions: planning, organising, directing and controlling. His contribution to the modern concept in management, made him very influential in the early parts of the nineteenth century. When the prefix self is added to management the meaning becomes management directed towards oneself based on one's own effort and capabilities and how we control our own behaviour. This is known as self-management (Hornby, 2006).

According to Bandura (1977), self- management is defined as the skills and strategies by which individuals can effectively direct their own activities towards the achievement of objectives. This includes goal setting, decision making, focusing, planning, scheduling, task tracking, self-evaluation, self-analysis, and the development of self. Self-management is defined as management by oneself and the taking of responsibility of one's own behaviour and well-being Mconnell (2005). Newman and Eyck (2005), defined self-management as the use of behavioural strategies to modify one's own behaviour. In self-management, the paramount idea is the "change". It is about how an individual controls own behaviour to suit the purpose to achieve desired goals.

The concept of self-management therefore, emerged to respond to the need for improved methods of promoting a more holistic approach to psychology, led by behavioural therapist, such as Watson (1924) and Thorndike (1930). Their therapies focused on helping individuals understand how change in behaviour, can lead to changes in how one feels when the main goal is focused on increasing the person's engagement in positive or socially reinforcing activities. Based on this premise, the technique on how an individual manages self to succeed optimally is adopted to reduce the anxious states beclouding pupil's imagination in the class and in scenarios where the subject is applicable.

Self-management is often broken down into several components. These are self-monitoring which involves the careful and regular observation and recording of one's behaviour; self-interaction which entails the application of one's knowledge to other areas of learning; self-reinforcement which is a process by which the individual administers positively reinforcing stimuli each time there is a desirable response; self-regulation a process dealing with the individual's determination to achieve attainable set goals etc. For the interest of this study, self-monitoring, self- interaction and self- regulation will be discussed.

Self-monitoring

Self-monitoring refers to the degree to which people attend to, and control the impression they make on others. It deals with a situation where one observes one's behaviour and identifies the presence or absence of the target behaviour Piane (2000). In self-monitoring, the person who seeks to alter his behaviour defines precisely the criterion for the behaviour to be attained. For example, a pupil who despises practicing his mathematics assignment wants to change to spend time practicing and attempting his assignments. The pupil's main goal here is to stop despising the subject. From this other sub goals can be derived such as:

1. Taking his mathematics text book home, after school.
2. Relaxing after the siesta and getting his exercise book ready for the mathematics practice.
3. Starting to solve the mathematics assignments.

These statements thus compel the pupil to choose between being anxious about mathematics or by embracing it. Also, people vary in their awareness of how they perceive others. People who are high self-monitors are very sensitive to their impact on others and actively seek information about how they are expected to behave and try to tailor their action accordingly. (Macleod, 2008). On the other hand, low self- monitors are less concerned about impression management and they behave more spontaneously.

A good number of researchers such as Newman and Eyck (2005); Busari and Osiki (2001) have carried out various research works in the field of counselling and have pointed out the advantages of self-monitoring in enhancing one's ability in self-management. They opined that the primary benefit for learners is the shift of control over the target behaviour from the teacher to the pupil, thereby increasing the pupil's independence and decision making to suit his/her academic purpose. The gains in employing self-monitoring strategies as regards to this study is that it can allow a teacher to spend fewer hours in managing the classroom, in terms of moral up-liftment and, academic progress of the pupil in his/her care because the pupil understands the need to be involved in reducing the anxiety which he feels each time the subject is merely presented (Scott, 2012).

Self- interaction

According to Scott (2012), self-interaction is the dynamic process that encourages individual's participation or involvement in creating new knowledge and application of such knowledge to other areas. In a school setting for example, self-interaction enhances activeness in the class where the learners involved are given the opportunity to take a more interactive relationship with the subject matter of a course and as well, encourage learners to generate ideas rather than being passive recipients.

Self-regulation

This involves setting goals and directing behaviour to meet those goals. A key aspect of self-regulation is self-efficacy which is an individual's belief that he/she can achieve specific goals. For example, a pupil might decide to set aside two hours each day for intense practice of his mathematics assignment. In making this decision, other distractions at the point in time are not allowed to derail the pupil's design thought to achieve success. Simple steps in achieving this purpose can be designed thus:

1. Watch the things you do (see your counsellor).
2. Talk to yourself in only positive terms
3. Control your outburst and work on developing it.
4. When studying, relax and believe in yourself.
5. Gradually study a step at a time.
6. Do a general revision to know if you are in line with your set goals.
7. Learn from feedback to avoid repeating your mistakes.
8. Sleep when you are tired.
9. Give yourself a treat for a job well done.
10. Always remember to manage time properly to achieve set goals.

Self-management can be defined as an individual's set strategy to independently complete tasks and engage in active roles in monitoring and reinforcing their own behaviour (Rock, 2005). A positively reinforced behaviour may necessitate a small level of self-management or a wide spanned scale of self-management. Learning and teaching self-management skills therefore, can have many advantages and numerous benefits to the individual who is learning or implementing the skills. It is the belief of the researcher that, appropriate self- management skills and the ability to use self-management strategies effectively might be a skill that becomes very important for success as children growing into adulthood. For the purpose of this study, self-management is viewed as an important goal in education, relevant to foster self-reliance and independence.

Diagramatic Expression of Systematic Desensitization and Self-Management Techniques in Reducing Mathematics Anxiety

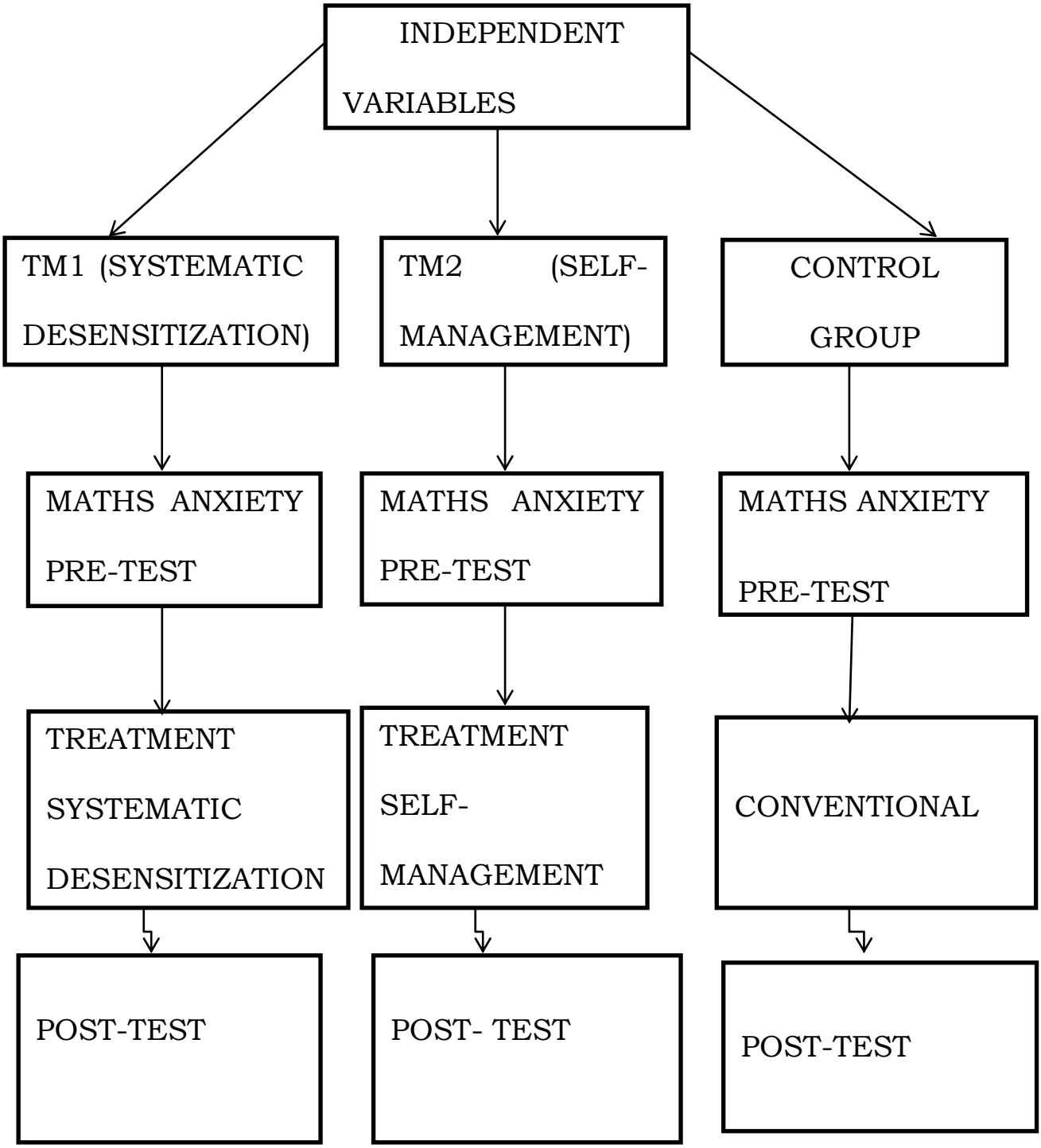

INDEPENDENT VARIABLES
TM1 (SYSTEMATIC DESENSITIZATION)
TM2 (SELF-MANAGEMENT)
CONTROL GROUP
MATHS ANXIETY PRE-TEST
MATHS ANXIETY PRE-TEST
MATHS ANXIETY PRE-TEST
TREATMENT SYSTEMATIC DESENSITIZATION
TREATMENT SELF-MANAGEMENT
CONVENTIONAL
POST-TEST
POST- TEST
POST-TEST

Fig II

Theoretical framework

According to Howley (2002), a lot of theories abound from psychologists and counsellors on pupils' academic development. These theories emphasise different techniques on reducing anxiety generally and they maintained that, a functional effect exist in ameliorating pupil's mathematics anxiety to higher acceptable standards. These theories were also selected because no single theory had all the needed postulations to handle the present study although a relationship exists between them even with their specific peculiarities. To complement the above explanation, the scope of this research is limited to the works of the following, namely; Spielberger's state-trait theory which emphasised that individuals have a complex but unique emotional condition that varies in intensity and fluctuates overtime.

Pavlov's respondent conditioning theory which postulates that individuals learn through a process in which an innate response to a potent stimulus comes to be elicited to a previously neutral stimulus achieved by repeated pairing of the neutral stimulus with the potent stimulus. Bandura's Social Learning theory which posits that learning is a cognitive process that takes place in a social context and can occur purely through observation or direct instruction. Hall's drive reduction theory which formulates that anxiety acts like a potential drive, which not only motivates behaviour but also reinforces the responses which have the effect of reducing the strength by the anxiety state. Also, Ryan and Deci's self-determination theory focuses primarily on internal sources of motivation such as need to gain knowledge or independence. It deals with the necessary behavioural links that motivates an individual to leaning maximally.

State-Trait Theory on Anxiety

According to Spielberger (1992), anxiety could be classified as State anxiety (A- State) and Trait anxiety (T- Trait). The theory assumes that the arousal of anxiety states, involves a process or sequence or temporarily ordered events initiated by either internal or external stimulus that are perceived to be dangerous or threatening by an individual.

State Anxiety (A- State) is believed to be a transitory emotional state, which has a temporal dimension because, it exists at a given moment in time and also vary in intensity and fluctuates over time.

It is a state which can re-occur when evoked by appropriate stimuli and lasts for as long as those stimuli persist. He identified State anxiety as an unpleasant emotional stimulation that occurs when a person comes in contact with frightening stressors or dangers.

It is further characterized by subjective, consciously perceived feelings of tension and apprehension as well as an increased activation of the autonomic nervous system. Speilberger (1992) described the State Anxiety (A-State) as a complex but unique emotional condition that varies in intensity and fluctuates overtime. It should be noted that he conceptualized anxiety state as compromisingly unpleasant, This is comparable to Freud's original conception of anxiety as an emotional state.

For example if a pupil is presented with test papers to solve some assumed difficult arithmetical problems he did not understand and is quickly reminded that he must solve and pass the test to sit for an external examination automatically, the autonomic nervous system of the pupil will become heightened. This is because state anxiety as supported by a normal physiological response is presented where the feeling of anxiety eventually subsides and the person becomes normal again.

While Trait anxiety (T-Trait) is a relatively enduring individual difference in their proneness to anxiety, it is individually an inherent disposition to perceive many situations as dangerous and therefore, react to such situations with anxiety state. He further stated that, trait anxiety signifies a person's continual tendency to react with state anxiety because, they are persistently expecting bad circumstances to transpire. Trait also includes the tendency to react frequently and with great intensity to threatening situations.

Trait anxiety also known as (A-Trait) is ingrained in a person's personality. According to Braver (2008), an individual with the disorder tends to view the world as a dangerous and threatening place. These individuals tend to worry more than most people would do under the same situation and they feel inappropriately threatened by several things in the environment. For example, in a situation, where most people will react in an anxious way, individuals with trait anxiety would react in an overly, almost debilitating, anxious manner. According to Spielberger (1992) people with trait anxiety do not often feel normal and are always with some type of anxious feeling.

The relationship between the two types is that, people who have high anxiety trait (A Trait), often perceive a larger number of situation as threatening than those with low anxiety trait (A- Trait). The former also respond with greater intensity of anxiety state (A-State).

This theory propounded by Spielberger is generally believed to be one of the theories of anxiety because it removes the major cause of disagreement on the concept of anxiety by separating anxiety state from anxiety proness. Speilberger's concept on anxiety combined these two and also made it easier to differentiate anxiety from other related states. The theory is especially concerned with clarifying the properties of A-state and A-trait as psychological constructs, and with specifying the characteristics of stressful stimulus conditions which evoke differential levels of A-state in persons who differ in A-trait. The theory also recognizes the centrality of cognitive appraisal in the evocation of anxiety state, and the

importance of cognitive and motoric processes (defense mechanisms) that serve to eliminate or reduce anxiety states.

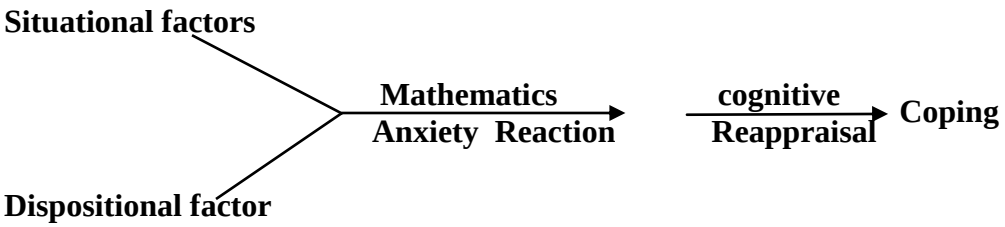
Ibe (2008) pointed out that, the confusion about the meaning of anxiety is due to lack of agreement as to whether the term should refer to observable and recordable physiological state or to a hypothetical state. Finally, the approach makes it possible to see the context in which anxiety develops and identifies stressors or external stimuli. This model makes application of therapy possible, since the context of anxiety will be known and therefore easy to locate the antecedent and maintaining factors.

Spielberger (1992) stated that, situations which have ego-involving instructions, risk of failure or other evaluates e.g. intelligence on tests are most threatening to pupils with high A-trait. In other words, it is the situation that determines whether the pupil will react with high A-State. The more dangerous the individual perceives the situation, the greater the intensity of anxiety State (A-State) evoked. Other factors such as aptitude, ability and past experience as well as the objectives also have an effect on individual's anxiety reaction. The trait anxiety describes individual differences in anxiety rather than situational experiences. Anxiety as a process refers to "the sequence of cognitive, affective, and behavioral responses that occur as a reaction to some form of stress" (Spielberger, 2000) Through Spielberger's anxiety-as-process model, anxiety is considered as a result of a series of reactions to the psychological threat.

For example, if a pupil who is high in A-Trait State is faced with mathematics tests or examination, he/she is likely to do well in the test or examination because the individual possess the requisite skills and experience to scale through in such tasks. However, a pupil who is easily agitated when faced with such mathematics questions is likely to possess the A-state type of anxiety and likely will perform poorly in tests as a result of instant fright which could lead to lack of relaxation and coordination to carry out the required tasks. State-Trait

theory relies on hard or statistical data. It is not biased nor subjective. However, it does not account for personality changes both temporarily and in the long run. Since it does not address trait development, it offers little or no guidance on how to change trait aspects. Also, it does not address how positive traits can be highlighted or even how negative traits can be ameliorated. The emotional fluctuation emphasised by Spielberger, may not be enough to reduce or reverse the state of a pupils level of anxiety in mathematics. Based on this premise, a complimentary theory as respondent conditioning theory was used.

In conclusion, the consequences of anxiety are viewed as negative, interfering, debilitating and maladaptive when the level of anxiety is higher but, when it is moderate, anxiety can be facilitating, adaptive and therefore make for good adjustment. However, the fluctuation of emotional condition as emphasised by Spielberger may not be enough to reduce or reverse the state of s pupils' level of anxiety in mathematics based on this premise, a complementary theory as respondent conditioning theory was used.



Respondent conditioning theory

Behavioural theory of respondent conditioning is embedded in the theory of Ivan Pavlov (1927). His theory focused on acquisition of learning through responses that are elicited by antecedent stimuli. He theorized that people learn through repeated pairing experiences of the

neutral stimulus with the potent stimulus in which an innate response is produced through paired association

Pavlov explained in his theory that, respondent conditioning occurs when a conditioned stimulus (CS) is paired with an unconditioned stimulus (US). Usually, the conditioned stimulus is a neutral stimulus (the sound of a turning - fork), the unconditioned stimulus (US) is biologically potent (e.g. the taste of food), and the unconditioned response(UR) to the unconditioned stimulus is an unlearned reflex response

(e.g. salivation). It is expected that after pairing is repeated, some learning may likely occur.

Pavlov (1927) conducted an experiment pairing a bell with meat powder until the bell produced salivation for the dog, when the dog saw meat powder, it automatically began to salivate. Gradually the sound of the bell was introduced at every point the meat powder was presented to the dog. Over the period, the dog began to associate the ringing of the bell with the presence of meat powder. By constant repetition of this act over a period of time, the dog started to salivate at any point in time the bell was rung, even when there was no presentation of the meat powder.

In psychological terminology, it could be inferred that, the dog began to associate the conditioned stimulus (the bell) to the unconditioned stimulus (the meat powder). This became a conditioned response to a conditioned stimulus (salivation at the sight of the bell). This is in line with how mathematics teachers manipulate instructional learning environments to produce positive behaviour or decrease maladaptive behaviours through constant repetition and practice of relevant concepts each time mathematics is presented. Through this, it is expected that the learner unconsciously will begin to accept the consistent rules in mathematics thereby reducing anxiety that may be witness in the course of learning the subject.

This theory is built on the premise that there are five important components of respondent conditioning.

1. Acquisition.

2. Stimulus generalization.

3. Stimulus discrimination.

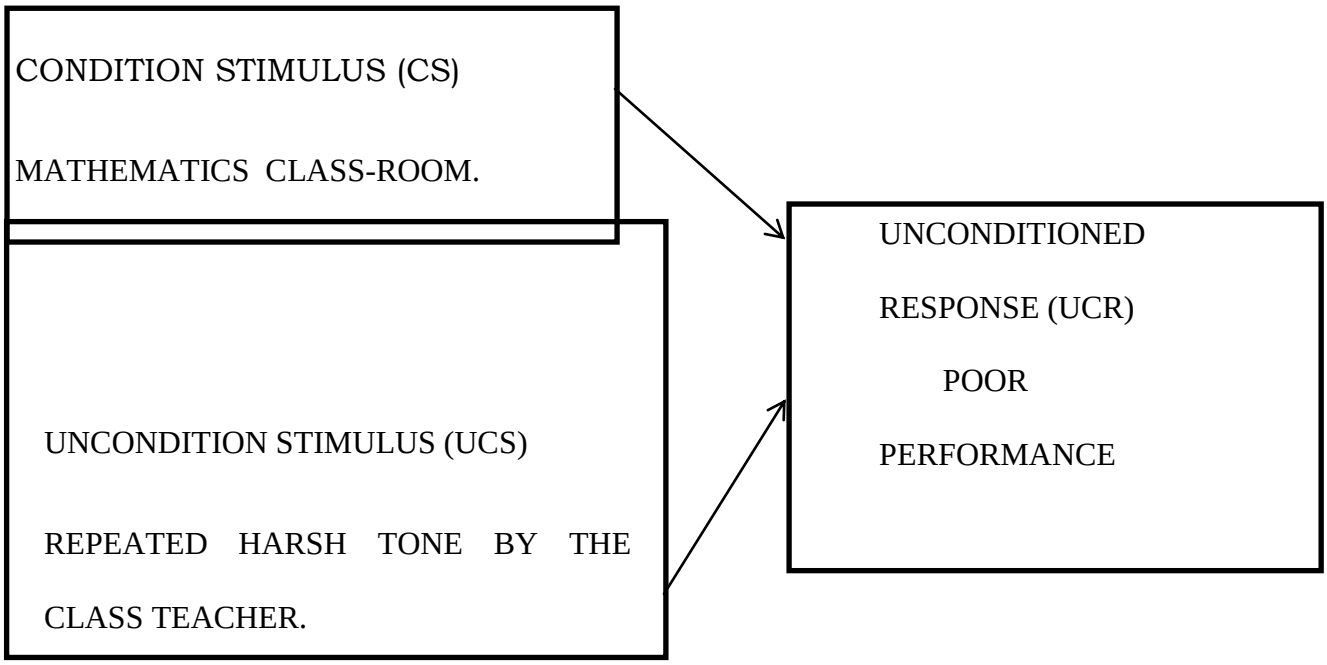
4. Extinction.

5. Spontaneous recovery.

The theory about respondent conditioning points out that, conditioning is often associated with the development of anxiety. Anxiety occurs as a result of highly panicky circumstances to specific objects or situations. For example, imagine a pupil of the primary five class, being reminded with a harsh tone by his class teacher regularly that, mathematics is a core subject that must be passed yet, the pupil with so much struggle to understand the rules guarding mathematics is confronted with the harsh tone. In his memory also, the pupil remembers he still fails the subject anytime class tests are given. The constant harsh tone from his class teacher functions as the unconditioned stimulus (US) eliciting anxiety. These constant harsh tones are paired with the poor marks of failure the pupil gets. This becomes the conditioned stimulus (CS) triggering anxiety even when the class teacher is absent and mathematics assignments are given. The pupil might even reach a point at which the mere thought of mathematics or ordinary figures when he is elsewhere might elicit anxiety.

Diagramatic representation of Respondent conditioning of anxiety.

As described above, a stimulus (In this case, a mathematics classroom), that is frequently paired with anxiety-arousing events (constant harsh tone and mathematics poor performance) may come to elicit anxiety by itself, through respondent conditioning, as shown in the diagram below:



However, predictive relationships are essential in that, some stimuli can be conditioned more readily than others and that the conditioned stimulus and unconditioned stimulus can be separated by several hours of intervention.

Pupils' mathematics anxiety works in line with this theory as a means of psychotherapy. The systematic desensitization treatment procedure involves the process of counter conditioning or learned behaviour modification, which means that, learning could be dissociated to the mathematics anxiety symptoms which pupils feel, from the object that causes it. To achieve this, the person who is mathematics conscious is exposed to the object that causes anxiety in such a way that, very minimal amount of distress is witnessed with constant exposure to the feared object. This is achieved through the anxiety hierarchy, where objects that cause greater level of anxiety are managed through constantly exposing the individual to that anxiety provoking situation. When practiced over a period of time, the fear witnessed by the individual will be overcome or significantly reduced. In other words, rather

than avoiding the mathematics anxiety-causing object for example, a person learns to cope with it, and gradually overcomes his or her fears, using the systematic desensitization technique.

Systematic desensitization is a type of behavioural technique based on the principle of respondent conditioning. The behavioural therapy's objective is to eliminate the mathematics anxiety response of a pupil and substitute it with a relaxation response to the conditioned stimulus using respondent conditioning.

In line with Pavlov's theory on respondent conditioning, McLeod (1993) opined that, creating an anxiety hierarchy involves the conditioned stimuli ranked from least anxious to the most anxiety provoking. For example, if a mathematics anxious pupil is aware that a mathematics test is two weeks away, that might not pose any threat. However, if he /she becomes aware that the mathematics test has been scheduled to be written in the next two days, it could create a threatening situation. In this case, the individual tries to reach a state of deep relaxation and is then asked to imagine (or is confronted) by the least threatening situation in the anxiety hierarchy. The individual repeatedly imagines the anxiety provoking situation until it fails to evoke any anxiety. This will indicate that, the therapy has been successful and until the most provoking on the hierarchy is reached, the processes would be repeated while working through all the situations to reduce the pupils' anxiety.

However, all respondent conditioned responses must involve a reflex. Therefore, what Pavlov postulated when this is applied to mathematics learners is limited. Based on this, social learning theory is investigated.

Social learning theory

Social learning theory, first developed by Albert Bandura in 1977, theorized that you learn within your social environment. In other words, you learn about yourself, others and the world around you from observing, modeling and imitating the attitudes, reactions and the behaviour of others. In his theory, he emphasized that, people acquire knowledge primarily by being exposed to it rather than through discovery which is why the way and manner an individual thinks and behaves is usually believed to have a link with the understanding he has acquired from his environment through observation and imitation.

This theory is also referred to as cognitive learning theory. It focuses not on internal conflicts but on ways in which anxiety becomes associated with certain situations via learning. As propelled by Watson (1958) in a classic experiment with the "little Albert", he observed that, an eleven (11) month old child learned to be afraid of a rat because of its association with a fear-producing stimulus. When the young boy was first shown a white rat, he reached for it, evidencing no fear but any time he touched the animal, he was frightened by a loud sound. The boy quickly became afraid of the rat, and this fear generalized to other furry objects such as his mother's fur coat.

The learned behaviour conception of anxiety explains the process whereby anxiety is learned and functionally serves to motivate trial and error behaviour by the organism to reduce the pain of anxiety. Successful reduction of anxiety consequently reinforces the learning of new habits. However, social learning therapists such as Pavlov (1902) and Eysenck (1982) who worked in line with the belief of Bandura, opined that your actions, environment and personal characteristics, equally influence each other through the process of modelling.

The modeling process consists of the following steps:

1. Attention – In order for you to learn a new behaviour you must pay close attention to what the model is doing. For example, if you are trying to model better mathematical skills, you must focus on how the model or "teacher" approaches the topic with the pupils.

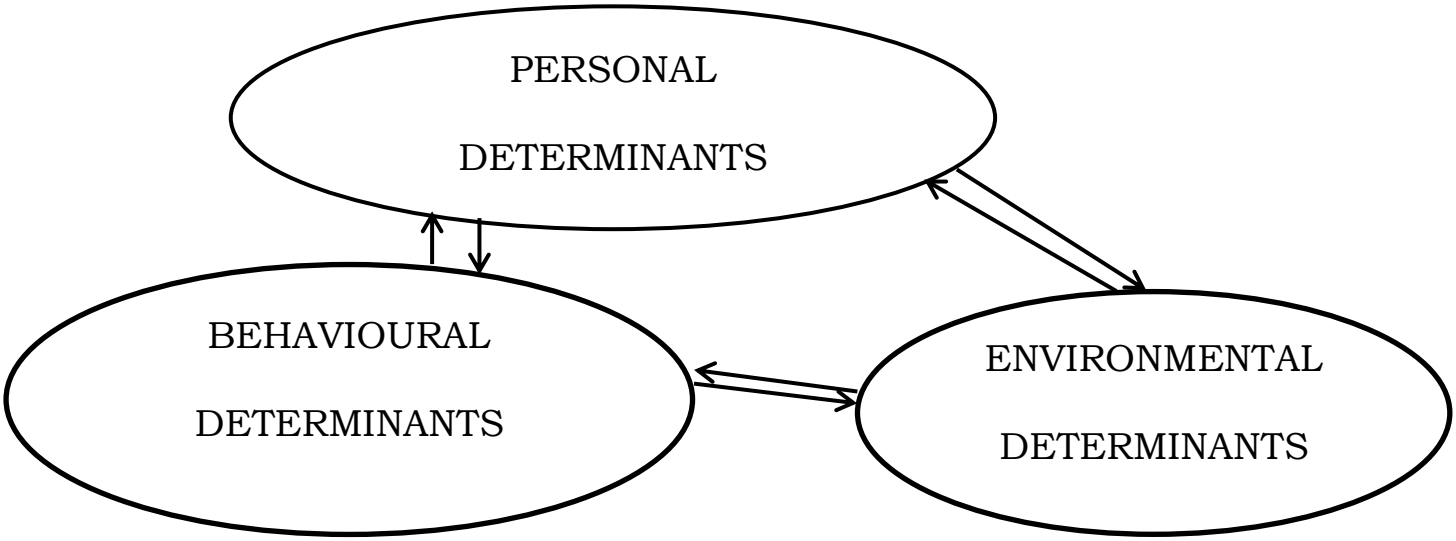
2. Retention – It is also important that you remember what the model did so that you can repeat the desired behaviours in the future. For example, if you see a pupil during the break period solving a class maths work in a positive manner, then it is important that you remember exactly what you saw so that you can apply what you saw sometimes in your free period.

3. Reproduction – During the modeling process, you must apply what you have learned to your everyday life. This part of the process takes time and will improve with time and practice. For example, if you learn a positive way to cope with a stressful situation, it is important that you continuously work on using the positive coping technique whenever that situation arises.

Similarly in reducing pupils' anxiety, in mathematics, pupils observe each other in their class, imitate and model others' behaviour with a view to learning and reducing the anxiety they witness in the mathematics class and as well achieve more in mathematics, just as theorized by Bandura. If the model is interesting and novel, members pay attention, which may result in learning different and easy approaches to problem solving; as such, facilitate storing, retaining and remembering what one has paid attention to and in reducing the anxiety they have for mathematics.

Social learning theory is generally believed to easily handle inconsistencies in behaviour, explain how behaviour is learned, offers ways to integrate social and cognitive theories, it also allows and accounts for cognitive processes and explains a large number of behaviours. The social learning theory is however known to be too heavy on what happens instead of

what the observer does with what happens. As such, the theory does not take into account, physical and mental changes of an individual and does not explain all behavioural and self-deterministic differences of individuals as is expected of pupils for example, who are mathematics anxious.



Self-Determination Theory

In trying to explain the behaviour frame, Ryan and Deci (2000), developed the self-determination theory. They postulated that, self-determination theory is a theory of motivation, concerned with supporting one's natural or intrinsic tendencies to behave in effective and healthy ways and that it is a compelling model which can help one to understand the necessary link between the behaviour of an individual and what motivates the behaviour for learning to be achieved. It examines the degree to which an individual's behaviour is self-determined with a specific intent based on inherent growth tendencies of the individual and inner psychological needs.

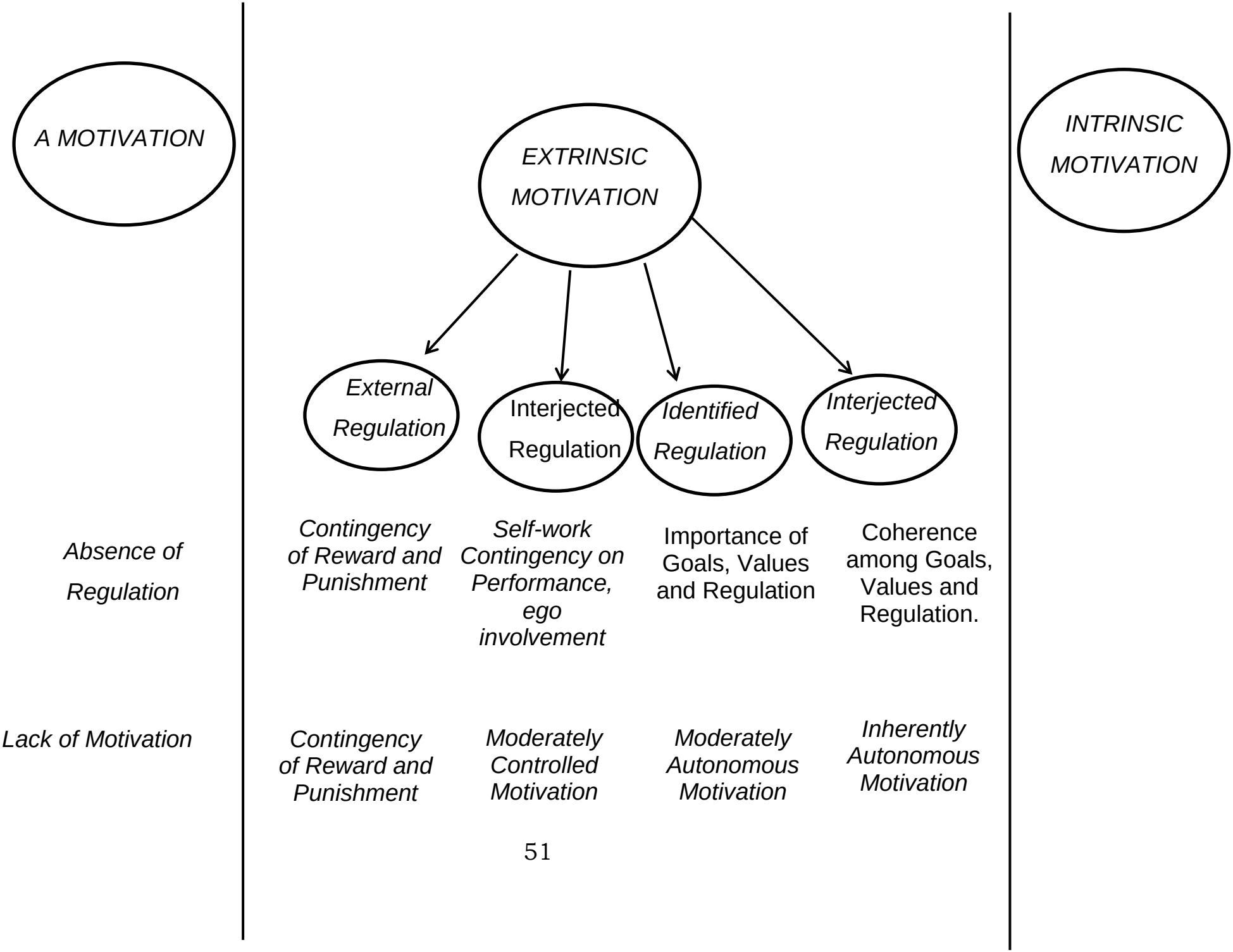
Concerning a pupil's mathematics anxiety being reduced therefore, Ryan and Deci (2000) postulates that, a self-determination continuum made up of varying levels such as non-

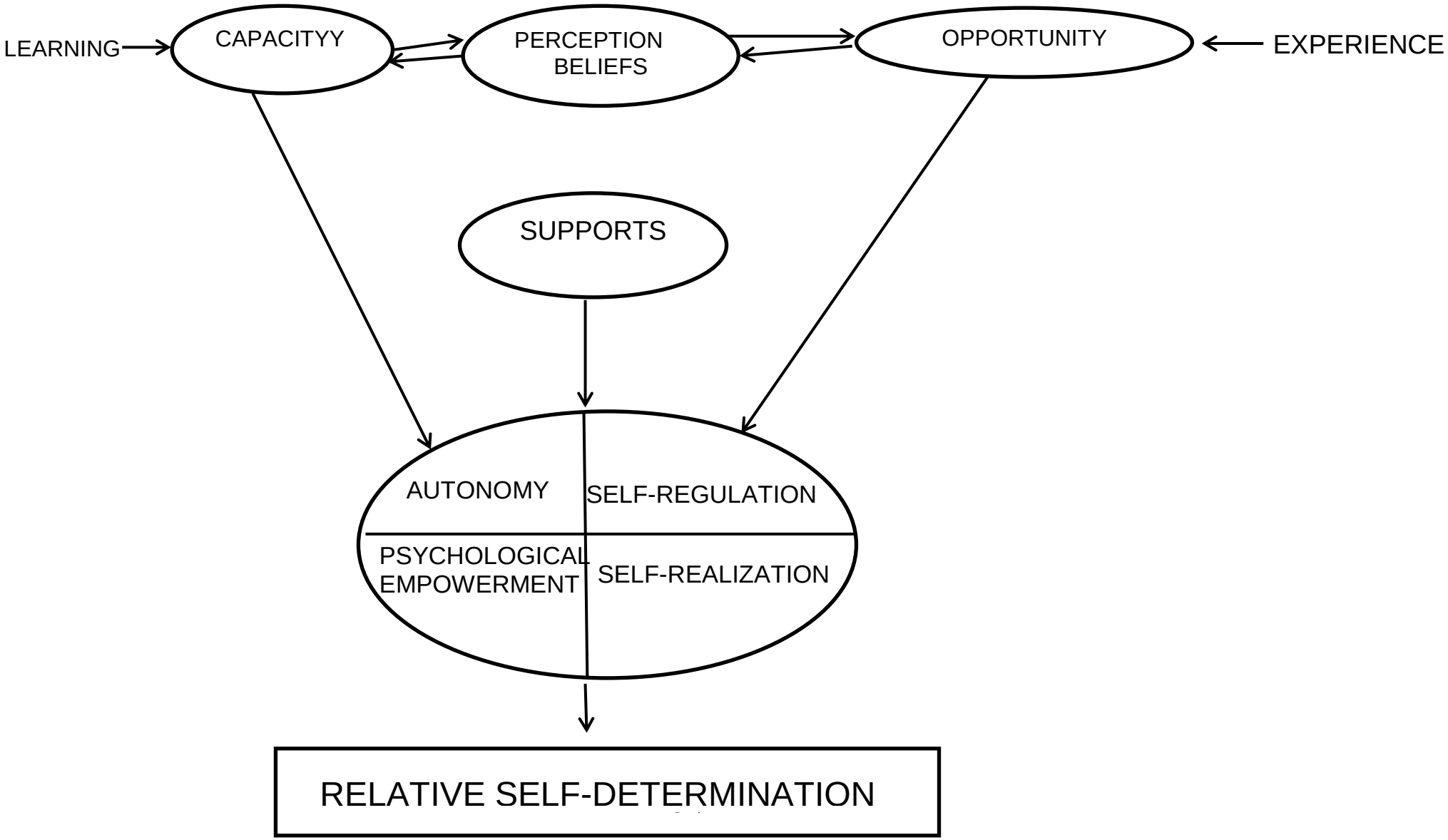
regulation, external-regulation, interjected regulation, identified regulation, integrated regulation and intrinsic regulation are capable of motivating or de-motivate a pupil in the learning process.

According to these psychologists, non-regulation, external regulation and interjected regulation are regarded as de-motivating, partially intrinsic and unwilling intentions by the pupil to achieve by themselves as a result of no intention to take action. For example, if a child in class decides to draw a bird in his mathematics exercise book when algebra lesson is being taught by the class teacher, it simple shows that the task is uninteresting to the child. He could be opening the book just to avoid his teacher's reprimands at that time. This causes anxiety; fear of failure, low self-esteem and above all, inner conflict with self.

On the other hand, identified regulation, integrated regulation and intrinsic regulation are more motivating for a pupil who value hard work and is personally committed to take actions based on his/her desire to do so. The resultant effect is confidence, enhanced performance, creativity, self -esteem and well-being of such a pupil. Therefore, the more self-directed the behaviour, the more inherently valuable, effective, enjoyable and satisfying it would be in realising set goals.

Finally, the above theories high-lighted were found useful in this study. The researcher therefore concluded that, each of these theories could complement each other to relatively effect reduction in the heightened anxiety face by primary school pupils in the higher class.


A MOTIVATION
EXTRINSIC MOTIVATION
INTRINSIC MOTIVATION
External Regulation
Interjected Regulation
Identified Regulation
Interjected Regulation
Absence of Regulation
Contingency of Reward and Punishment
Self-work Contingency on Performance, ego involvement
Importance of Goals, Values and Regulation
Coherence among Goals, Values and Regulation.
Lack of Motivation
Contingency of Reward and Punishment
Moderately Controlled Motivation
Moderately Autonomous Motivation
Inherently Autonomous Motivation


LEARNING
CAPACITYY
PERCEPTION
BELIEFS
OPPORTUNITY
EXPERIENCE
SUPPORTS
AUTONOMY
SELF-REGULATION
PSYCHOLOGICAL
EMPOWERMENT
SELF-REALIZATION
RELATIVE SELF-DETERMINATION

Theoretical Studies

The researcher analysed the opinions of different people concerning systematic desensitization and self- management techniques with a view to explaining more on how these techniques relate to anxiety reduction in mathematics. This was done under some sub headings.

Anxiety

There are many theoretical postulations on the possible origin of anxiety. These views range from the psychoanalytic to the component of anxiety. Although most theories vary in their conception of the nature and genesis of anxiety, nevertheless, there are common trends which make the theories to be more complementary than others.

Freud (1965) who was the first to focus on the theory of anxiety during the courses of investigating the "actual" neuroses differentiated between objective anxiety and neurotic anxiety. Freud viewed objective anxiety as a realistic response to perceived danger in the environment, synonymous with fear. He saw neurotic anxiety as stemming from an unconscious conflict within the individual, since the conflict was unconscious, the person was not aware of the reason for his or her anxiety.

Freud further gave the psychoanalytical explanation of anxiety. His theoretical views on anxiety were continually modified over the years hence, two explanation of anxiety are traceable to him. In his first conception, he called anxiety unconscious conflicts: Freud believed that neurotic anxiety was the result of unconscious conflict between the impulses (mainly sexual and aggressive) and the constraints imposed by the ego and super ego. Many impulses pose a threat to the individual because they are contrary to personal values or because they are in opposition to what society will permit. However, Freud later argued that it was anxiety that produced repression and not repression that produces anxiety.

Commenting on this, (Zettle, 2004) observed that both viewpoints may be correct since frustration due to blocking of an impulse can cause anxiety, and anxiety itself may also be a signal for the organism to repress the impulse.

Freud's second conception is somewhat complimentary to his first ideas, but slightly different. In this conception, the ego is regarded as the actual seat of anxiety as cited by Baloglu and Kocak (2003), adding that anxiety reflects a break down in ego functioning. Freud elaborating on his conception postulates that the mental apparatus has been created such that it can withstand only a limited amount of stimulations whose source and situation are threatening, then when the mental apparatus breaks down it results to anxiety because, there is no adequate defence in the face of such excitations.

Freud noted that the process of birth is the first process of overstimulation attended by anxiety and hence tagged it primary anxiety from which subsequent anxiety develops. The birth trauma he said creates primary anxiety since ego is not yet fully developed and so it is helpless at that time. However, there is a gradual shift from primary anxiety to subsequent anxiety when the mental apparatus begins to mature and it is differentiated into ego, super ego and id processes.

The ego component of mental apparatus is the sense of being a separate human entity and maintaining some balance between the animal instinctual demands of the id process and several reprimands of the super ego. To do this, it either avoids or inhibits stimulations coming to the mental apparatus but when it cannot do this, anxiety then sets in because the ego cannot maintain the balance between the id and the super ego.

According to Neo-Freudians, anxiety is the occasional strong sense of being a failure as a human being. This is derived from Sullivan's Postulations which states that, for an individual to develop through the stages of infancy, childhood, juvenile era, pre-adolescence and

adulthood, he needs to interact with the environment. The environment includes culture and others. Sullivan stated that, "… man is distinguished from plants and animals by the fact of human life which requires interchange with an environment which includes culture.

As the individual develops, he needs to be affirmed by others as being an acceptable human being. Sullivan unlike Freud, believes that anxiety is caused by negative reaction of others especially significant others to that individual. Zettle (2004) stated that "Anxiety is elicited by the experienced disapproval and or condemnation of significant others". He is therefore helpless following this experience and is temporarily cut off from his necessary "environment" perhaps for the fear of another disapproval or reprimand. Thus, Sullivan and Zettle's explanation seems more elaborate than Freudian concepts, since Freudian explanation is mainly in terms of intra-psychic progress, while Sullivan sees the organism as interacting with his environment and not merely discharging psychic energies.

Anxiety is a normal emotional reaction to stressful situations. But when it becomes excessive in some cases it is accompanied by changes in cognitive processes. These behavioural changes align with exaggerated worries which sometimes result in expectations of negative outcomes in unknown situations, creating excessive anxiety. This has been studied widely by psychologists and counsellors but, their neural substrate is not understood. Driscoll (2007). Behaviourally, the degree of intensity of anxiety and the multi-dimensional responses to stimuli in the person's environment are often observed when an individual is presented with stimuli that are distractive to his thought process and invariable, the feeling of anxiety will be induced (Bishop, 2006).Furthermore, an individual might be anxious temperamentally because of impairment in cognitive tasks that lack any threat –related material. (For example, there is evidence that trait anxiety reduces working memory as well as complex reasoning Richards, French, Keogh &Carter (2000). This research suggests that trait and state anxiety can modulate cognitive control even when the stimuli themselves are not anxiety provoking.

Another way by which anxiety might influence cognitive control and the associated brain regions is also by modulating regions involved in emotional processing, mainly the amygdala, (Dolcos and McCathy, 2006). In a comprehensive review of anxiety effects on attention control, Bishop (2007) has suggested that, in comparison with non-anxious individuals, people experiencing mathematics anxiety for example show hyper responsive amygdala activity in the presence of threat related distracters and the threat anxious individuals in particular, are also likely to show reduced regulatory response in lateral prefrontal cortex.

According to Anih (2004), this brings to bear that some situations state or trait anxiety could lead to a compensatory strategy of reduced activation of default regions, especially during difficult cognitive tasks. Such suppression might take place in order to improve performance by reducing the potential of emotional thoughts of the affected individual.

Mathematics anxiety

Spicer (2004) views mathematics anxiety as the outcome of low self-esteem and the fear of failure. It causes problems for processing incoming information as well as the previously learned information for problem solving. Pupils who are mathematics anxious generally tend to avoid mathematics when or wherever possible Ashcraft and Kirk (2001).

According to Garry (2005), the correlation between mathematics anxiety and academic performance is negatively significant. Moreover, Hambree (1990) found that, pupils who have high mathematics anxiety level, have lower mathematics achievement recorded in their tests. He also noted that, mathematics anxiety seriously constrains performance in mathematics tasks which causes pupils mental distress and abnormal/maladaptive behaviour particularly amongst women. Yezici and Ertekin (2010) popularized the notion that women and girls were suffering from mathematics anxiety", and called for the establishment of "math clinics' at the post-secondary level to attract women to mathematical study. More so,

research and sex-related differences in mathematical achievement had been going on for some time, and “math anxiety” or matho-phobia was well recognized in professional circles as contributing to underachievement in mathematics. What was new in the attention given to math avoidance and math anxiety was the link between poor mathematical skills and the cultural educational and occupational barriers experienced by women, and more importantly, the discovery that persistence associated with psychopathology rather than ability could account for male female differences in mathematical performance

Psychopathologies Associated with Mathematics Anxiety

Psychopathology is defined by psychologists as the study of mental distress and abnormal/maladaptive behaviour. In mathematics, this term is most commonly used amongst learners. It is discussed under three sub-heading:

1. The Math Memorizer: The psychopathology associated with anxiety produced in Mathematics memorizers is non-creativity. Ernest (2003) tells us that mathematics memorizers try to solve problems by concentrating their analytic powers or by attempting to identify formulae that can be applied to solve the problem. When no technique can be found, the math memorizer concludes that the problem cannot be solved. By constantly using the search for the maths strategy in problem solving (characteristic of the left hemisphere), the math memorizer denies the right hemisphere a chance to work on the problem. Since the right hemisphere is thought to be the site of creative thought, this constant denial results in the psychopathology of non-creativity.

2. The Math-Avoiders: The psychopathology that can be associated with mathematics avoidance behaviour is negativism. Smith (2004) believed that avoiders use past history of failure to predict further future failures. They become adamant with words like “I can’t”, “I couldn’t” etc. These words they self-profess seem to tally with their own belief. Thus,

negativism destroys the motivation and drive in and individual and it is the corrosive acid that eats away "will and purpose" (Ashcraft & Kirk, 2001).

For example, if an individual has a stagnant negative belief that no matter how hard he tries in mathematics, he will never pass the examinations ultimately, he will never do well because he has destroyed his will-power to fight defeat in that regard. This invariably throws the entire body out of its desired homeostatic state. (Zettle, 2004). Once this is accomplished anxiety will prevail and creativity will never be achieved.

3. Self-Professed Math Incompetent: The psychopathology associated with the anxiety produced when one professes himself or herself mathematically incompetent, continue to find problems that they are unable to solve related problem. As such, their ego takes a terrible beating because, they come to a conclusion that the onus of this inability to do mathematics lives with them and no one else. McLeod (2008).In explaining this phenomena, they emphasized that, even the teachers and their teaching strategies are never suspected as a reason for this incompetence. Rather, the self-professed mathematics incompetent person believes there is something "wrong" with him or her. Consequently, their self-esteem level plumes to new lows. As a result, the individual becomes less mathematics confident and his level of mathematics anxiety increases. Thus, mathematics anxiety is a critical factor in a pupil's educational and vocational decision. In addition, it may influence the pupil's achievement in his or her educational and career goals.

Reducing mathematics anxiety

It is an uncomfortable fact that some children do not like mathematics even at a very low level as primary one (Anih, 2002). There are many general factors that are responsible for the

general dislike for mathematics, such as the nature of mathematics itself. This creates complication in the child, particularly when many numbers are involved.

Children, who exhibit difficulty with understanding the complications involved with the conversion of numbers, could end up facing negative chain reactions of frustration and confusion, particularly for the parents, teachers and even the children in question.(Zettle, 2004). According to Ashcraft and Moore (2009), this situation can be an emotionally charged experience for the child particularly. This he believes could increase the child's level of anxiety and suggests that, in reducing mathematics anxiety therefore, the class Mathematics teacher should share observations of the child's Mathematics profile and discuss where the breakdown is occurring. Questions based on worries and concern should be discussed. For example: Does the child have problems with a particular sub-skill, such as multiplication facts or division procedures? Do difficulties in memory, language, attention, sequencing, and spatialordering or higher-order cognition seem to affect the child's Mathematics skills?
When these questions are answered, then a solution which would include a one-on-one attention would be adopted to wade off anxiety for the subject or reducing the problem to the barest minimum.

Ernest (2003) argued that, poor teaching can be one possible source of Mathematics anxiety and suggested that, "Learners with Mathematics fear possess heightened mathematics anxiety and to reduce this negative affect, instructors who are patient and encouraging should be made to constantly engage such affected pupils in their school work and attempted home work on submission. This is because, they need instructors who can help them gain self confidence in doing Mathematics and who can help them come to believe that, they are capable of learning the subject."

Other anxiety reducing strategies include; accommodating various learning styles, making mathematics relevant, providing positive Mathematics experiences and classroom atmosphere, modeling problem solving and logical thinking instruction, using instructional games that require original thinking, building confidence and using assisted computer instructions (Nwokolo, 2006).

In reducing Mathematics anxiety, emphasis could be placed on empathy, which is the understanding and sympathizing of other people's feelings. According to Okoye (2006), empathy can reduce children's discouragement and anxiety about their difficulties with any difficult task, even when this difficulty relates to understanding mathematics in the following ways:

1. Emphasizing optimism. Okoye believes that mathematics anxious children can improve by working on their weaknesses by making their strengths stronger and that the child's strength of control could be built by encouraging the child to be accountable for his/her own progress. A child who has difficulty remembering multiple steps in solving a mathematics problem for example, can learn to use sub-vocalization strategies to organize and guide his or her own effort.

2. Teach meta cognitive strategies. For some pupils, a teacher will need to provide direct instruction to help children think about their approach (previewing), pursue facts and self-monitor. Pupils also may need strategies to help check the precision or the reasonableness of their answers and may need repeated instruction and practice in how to apply these strategies.

When there is emphasis that no one is to blame and that children work at different pace and ways to learn Mathematics for example, the children would likely eliminate any stigma once they are reassured that they would be helped to find ways which would assist them in crossing the difficult hurdle of problem solving. Also, Anih (2002) also emphasized that, when pupils' strengths and interests are discussed with the use of concrete examples, the likelihood that it would reduce their level of Mathematics anxiety is certain. For example: An

instructor of Mathematics might tell a pupil who seems to make friends quickly “You are a real peoples’ person”. In this case, when the teacher values the child’s interest, the child’s self-esteem unconsciously could become boosted and asking questions on how to solve a problem would not be an up-hill task.

Again, a child who enjoys drawing might be encouraged to draw pictures of a puzzle problem, as the teacher tries to solve them on the board for all the pupils in the class to relate such puzzle to real mathematics stated on the board. When the relationship is understood, the pupil’s mathematics anxiety to a large extent will be reduced even in areas of weaknesses, the teacher could take it as his or her responsibility to bring together those pupils noticed to exhibit anxiety in the Mathematics class, and find out what aspect of the concept proves difficult for them. By this, the child’s level of anxiety might be reduced to the barest minimum knowing someone is willing to show positive concern for his achievement and future enhancement.

According to Salman (2005), protecting pupils from public humiliation will help strengthen their self-esteem and maintain their pride, once it is related to their learning differences. He also emphasized that, pupils should not be criticized in public but that they should be protected from embarrassment in front of siblings and classmates. For examples, anxious pupils should not be asked to come to the board to solve some multi-step mathematical problems with so many procedures until they have become comfortable with the concept to a point where their anxiety level will not affect their level of cognition, if asked to explain how much they have understood the topic in question. Only then, would the pupil feel comfortable to conquer some level of anxiety, and solve some problems in front of his/her classmates. He emphasized that confrontational and competitive aspects of Mathematics, particularly those that create anxiety such as speed and speed drills should be downplayed as this will encourage pupils to find the connection between Mathematics and other skills or subjects for

their potential strengths and interests in the subject to be increased. This process it is believed will create a shared sense of optimism and reduction in anxiety.

Anih (2002) opined that, in teaching children proven strategies, anxiety for the subject Mathematics will be reduced if pupils in the higher primary classes are provided with specific age appropriate methods used in checking work done. This motivates them knowing that, they can on their own check the answers to the given maths problems.

According to Smith (2004), TIPS which is the acronym for (Think, Information, Problem and Solving) is a certified technique adopted thus: Think (read and paraphrase). Information (What numbers and information do you need in order to solve the problem?) Problems (Write simple equation) and Solve the problem. Using this, the class teacher can make a chart on the class wall as a reminder for the children to enable them make quick references by adopting this technique. These highlighted techniques to a large extent, will likely reduce general Mathematics anxiety in higher primary school pupils if properly adopted.

Systematic desensitization

Systematic desensitization is a procedure by which new behaviours are learned in response to stimuli that previously elicited other behaviours. Information giving, relaxation training, establishment of hierarchies and counter-conditioning procedures are included in the strategy. Systematic desensitization involves three steps.

1. The first step is to teach the student relaxation techniques, typically with teaching the students to tighten and relax various groups of muscles. This should be practiced for 10 –15 minutes every day to become comfortable with the technique.

2. Following this, the pupils and therapist develop a fear hierarchy. In the hierarchy the pupils will develop a list of 15 –20 items that become increasingly more fearful on a scale of 0 – 100.

3. The third and final step is to have the pupils imagine each of the items on the hierarchy in order from least fearful to most, while engaging in the relaxation technique taught by his or her therapist.

Egbochukwu (2005) and Smith (2004) revealed that, systematic desensitization is effective in reducing mathematic anxiety while acknowledging the fact that different studies had established its efficacy at ameliorating mathematics anxiety. Desensitization is described in this text in terms of counter-conditioning in the sense that, relaxation is conditioned to stimuli that has previously elicited some level of anxiety. The overall effect of this conditioning takes a gradual process by moving from the anxiety producing state through to the relaxed state. Conditioning is generally terminated when the client feels neutral, that is, no anxiety. The purpose of the hierarchy is to maintain relaxation which is dominant to anxiety.

However, desensitization research has suggested the important facilitative effects of relaxation training and the use of hierarchies, neither of which is needed for extinction. Fritscher (2009) suggests that the facilitative effects of relaxation and use of hierarchies are because of the fact that, they encourage the client to approach and be exposed to the feared stimuli. Another interpretation of desensitization is that it is based to some degree on learning controlled attention shifts (Berger, 2005). That is, the desensitization procedure teaches the client how to shift his attention away from the feared object. Currently little research delineates the role of this variable, although it seems of minimal importance, most people suffering from some kind of phobia are already skilled at shifting away from anxiety sources, and this often impairs their work in desensitization when they should attend to the anxiety scene.

Finally, several theorists suggest that desensitization is best interpreted and carried out as a form of self-control of anxiety (Duffy, 2011). That is, desensitization is not counter

conditioning to specific situations which then generalizes to other situations. Rather, it is learning a general coping skill for dealing with anxiety situations. The client learns how to sense anxiety and switch into a more relaxed state.

On account of this work, systematic desensitization will be used and related works will be highlighted. Systematic desensitization as defined by Joseph Wolpe the developer of this behaviour therapy (1973), explains that, the technique is a form of counter conditioning that trains the client to maintain a state of relaxation in the presence of imagined anxiety-inducing stimuli. According to Berger (2005), the process of systematic desensitization requires that the anxious client learns three distinct skills and actively practice them over the course of time.

1. Identification and expression of subjective degree of anxiety.
2. Prioritization of steps towards the feared objects from least to most anxiety inducing.
3. Acquisition and pairing of relaxation skills.

According to Frederickson (2000), Systematic Desensitisation is a therapeutic treatment, employed in the field of psychology, to treat phobias and other anxiety causing conditions. This has been a therapy used widely by researchers to remediate the maladaptive behaviour of both adults and children in different circumstances relating to anxiety. It is a behaviour modification therapy that involves the use of classical conditioning technique in relaxing an individual who is anxious.

As viewed by Zettle (2004), the technique systematic desensitization works to ultimately overcome and eliminate the fear of any particular object or situation by slowly having the mind adjust to it, and gradually accepting the fear. For this procedure to be effective, the individual is first taught the relaxation techniques. These include deep breathing, meditation

and learning how to relax the mind by relaxing each muscle in the body beginning from the head muscles.

This feeling of relaxation is made to be associated with any of the objects or situation (stimulus) that causes the fear. Slowly and steadily, the mind learns to associate the positive feeling with the negative stimulus in some kind of systematic-step-by step approach and gradually, the feared stimulus is overcome. In this technique, the principle adopted and the goal to be realized is to get the feeling of relaxation to dominate over the feeling of fear and anxiety for certain critical situation in the person's life so that the person can function much better with a relaxed mind set.

One principle in adopting the systematic desensitization therapy according to Piane (2000) is that, the individual in an anxiety state cannot experience anxiety if in a relaxed state. Another important principle relating to systematic desensitization is that of visualization. It is assumed that, if a person visualises a scene when completely relaxed, the probability that the person forms a mental image which will relate to the feeling of what he sees in reality will be closely related. According to Egbochukwu, Obodo and Obadan (2008), the imagined scene constructed in an individual's mind is exhibited to a large extent in reality under the same scenario. For example, if an individual is suffering from mathematics anxiety, and begins to imagine himself or herself about to start the examination with some form of relaxation, at the time the real examination is presented the same reaction will be exhibited with minimal anxiety. This it is expected will help such a person to improve self and perform much better than when he/she is anxious.

Zettle (2004) in one of his works used systematic desensitization to improve the self - confidence of a number of public school students who were anxious and who were not willing to participate in an oral arithmetic class test. According to him, anxiety during such

tests could cause one to lack focus on derivative goals both in the present and future purposes. Although Zettle's work and some others have been done on effect of systematic desensitization, as at the time of this study, the researcher is not aware of any such study that seek to determine the effects of systematic desensitisation in reducing mathematics anxiety among primary school pupils in Oshimili South Local Government Area of Delta State, the strength of this background therefore has necessitated the study.

As viewed by Zettle (2004), the technique systematic desensitization works to ultimately overcome and eliminate the fear of any particular object or situation by slowly having the mind adjust to it, and gradually accepting the fear. For this procedure to be effective, the individual is first taught the relaxation techniques. These include deep breathing, meditation and learning how to relax the mind by relaxing each muscle in the body beginning from the head muscles.

Although Zettle's work and some others have been done on effect of systematic desensitization, as at the time of this study, the researcher is not aware of any such study that seek to determine the effects of systematic desensitisation in reducing mathematics anxiety among primary school pupils in Oshimili South Local Government Area of Delta State, the strength of this background therefore has necessitated the study.

The use of the hierarchy is merely providing the client gradual practice in his self-control skill with a relevant and important anxiety source. Thus it is better during desensitization to emphasize the self-control approach and, evidence exists to suggest this is the case (Spielberger, 1992). Despite the different theoretical interpretations of desensitization, the practitioner should do the following:

a. During relaxation training emphasis should be put on the client learning to discriminate fine differences between relaxation and non-relaxation (e.g., anxiety, tension).

b. The client should learn how to use relaxation as a self-control skill in dealing with anxiety. This should be done in a variety of ways, including during counter conditioning with imagined scenes and later in vivo assignments. Otherwise, desensitization should be carried out as described above.

Variations of desensitization

There are many variations of desensitization and combinations with other procedures. The following sample of variations includes group desensitization, mechanization of desensitization, self-desensitization, dealing with pervasive anxiety, and contact desensitization.

Group desensitization

An advantage of behaviour modification is that in many situations it can be applied to groups of people at a time, thus saving time and expense. To apply desensitization in groups it is necessary to have a hierarchy common to all the clients. This is usually easiest accomplished if the fear is relatively common, specific, and not complicated with other psychological problems.

The second requirement is that the rate through the hierarchy should be geared towards the lowest anxiety provoking item. In other words, you do not advance to the next item until everyone in the group has been desensitized with the current item Berger (2005).

Self-management

According to Scott (2012), self- management is the use of behaviour therapies to train and modify one's own behaviour. In self- management, the main agent is the "change factor" which must be initiated by the individual through concerted effort the individual consciously makes.

According to Schlenker and Pontari (2000), there are some steps designed to help pupils reduce their state of anxiety, using self-management.

Steps in administering Self-Management

1. Bringing the target behaviour under control using externally managed (Guidance Counsellors or teacher administered) treatment techniques, when necessary.
2. Selecting a system of data recording, that is appropriate to the target behaviour and to the abilities of the pupils by acquiring or constructing the necessary materials (e.g. recording sheets, clip boards, timers and wrist counters).
3. Letting the pupils determine with a proper guidance, the performance and criterion that must be achieved to earn a reinforcer. This criterion can be specific and challenging but also achievable. In the early stages, it should be possible to attain it immediately rather than distantly. Also letting the pupils determine the proper guidance, the amount and type of reinforcer to be administered.
4. Instructing the pupils on how to use the data recording system. Considering modelling its use, simulating and role playing, conducting and supervising some practice data recording sessions in the environment in which the pupils' actual recordings will occur. Reinforcing the pupils when the pupils' recordings match the counsellors and restraining the pupils when the pupils' recordings are too inaccurate.
5. Beginning the actual pupils' self-management sessions and unobtrusively monitor the pupils performance, reinforcing the pupils' (with a bonus) when the pupils' self-evaluation of performance (against the criterion) matches the counsellors evaluation and permitting the pupils to self-reinforce for achieving the performance criterion.
6. Being progressive, gradually fading the matching requirement and permitting the pupil to self-record and self-evaluate independently. Gradually increase the

performance criterion for reinforcement, conducting periodic announced checks of the student's accuracy and appropriateness in self-reinforcing

Study and Time-Management

Study and time-management, are very important techniques of self-management. Time on task for study refers to the amount of time pupils spend attending to school related tasks (Corey, 2009). Managing study time will help pupils cope with the pressure of study, by organising essential bits of necessary information, such as following directions and engaging in learning activities.

For a pupil in the primary five to sit and study mathematics for example, he/she must make a conscious good deal of effort to change the way he/she studies, by devoting certain amount of time per day, to solve some mathematical problems and making sure the lesson plan is realistic and not impossible. Also, schedule of study created by self is adhered to. These are achievable if the following rules are adopted.

1. **Creating a balance for school work:** A pupil needs to balance his school work and extra-curricular activities, by prioritising time, remembering that the target is to improve on lapses witnessed in mathematics (Creigton- Lacroix, 2000).
2. **Pacing yourself**: A pupil is expected to make concerted effort to find the best speed for his/her study time and adjust accordingly. Pickering and Gathercole (2001) posits that, some mathematics concepts come to pupils more naturally and as such, studying such concepts can be quicker than other concepts which may take the individual twice as much time to understand,. It is expected that pupils take their time to study at the pace they feel comfortable.
3. **Getting enough sleep:** Making sure pupils get enough sleep. Scott (2012) has proven that it impacts positively on mathematics test taking and improves memory and

attentiveness, thereby reducing anxiety that may arise as a result of fatigue and lack of concentration.

4. **Clearing your mind.** If an individual has got so much problems bothering the mind, taking a moment to write down some notes about what you are thinking and how you feel before you start studying will help clear your mind and focus all your thought on your work.
5. **Eliminating electronic distraction:** One of the worst distractions for studying is electronic device. According to Rock (2005), a great majority of school children are hooked up to the social media, like the cell phone, in productive hours of the day. Primary school pupils have cell phones and at study times the phones are expected to be switched off, if proper study must take place (Petty, 2004).
6. **Finding a good study spot:** Gain control of your study space. You should feel comfortable so that studying becomes more enjoyable. The selected place where an individual studies should be free from distraction and must not be too comfortable to avoid the risk of falling asleep.
7. **Keeping the television turned off:** Having the television turned on while you study is a bad idea. It can distract an individual who is prepared to study or solve some mathematical problems for example. According to Dubord (2011), voices are extremely distractive because it engages the language centre of one's brain.

The time allocated for the instructional level of pupils must be appropriate and delivered in a way that is effective, meaningful, and efficient to motivate. (Fajemidagba, 1990) posits that managing time for study must not be made to overload the individual rather in the words of Oyeneye (1996) an effective time manager is the person who is productive, relaxed and confident at the same time. Therefore, when pupils become anxious over study time particularly as it relates to solving mathematics problems, they would be confident and relaxed.

Empirical Studies

Empirical studies are based on facts and experiments. Some psychologists have documented facts, which are credible to the use of the following:

Mathematics anxiety

Systematic desensitization techniques

Self-management techniques

Mathematics Anxiety

Researchers have generally explained the interference of mathematics anxiety in different ways.

A research was conducted by Garry (2005) on the effect of mathematics anxiety and academic hardiness on students in Atlanta Georgia, U.S.A. It was based on a study which was carried out in India, among adolescent students and, the variables considered were gender, age and academic success which were investigated to analyse if students' hardiness correlated significantly with impaired learning in mathematics. The respondents were 284 senior secondary school students (144 males and 140 females) in the age range of 15-19 years.

The instrument used for data collection was the Mathematics Anxiety Rating Scale India (MARS-I). The data were analysed using the mean and Analysis of covariance. (ANCOVA). The findings of the study showed that mathematics anxiety and academic hardiness in terms of gathering information about students' academic success are significantly correlated indicating that, mathematics anxiety is associated with detrimental outcomes, including impaired learning, and impaired performance.

Relatedly in a study conducted by Ernest (2003) using a cohort of 213 first year students in Exeter in the United Kingdom. Information was collected on students' group discussions on how students perceive mathematics generally and if their individual mathematics anxiety

levels can be accessed through three surveys: Face-to-face interview, Public places and written questionnaire. This study adopted the conscious involvement of students, making sure they relaxed all body parts, before answering any mathematics question and if systematic desensitization had a direct relationship with reducing the students' maths anxiety at a universal level. A group of 120 students were involved originally in the survey. The students were left to adopt their own style in reducing their mathematics anxiety. Ninety three (93) students completed the survey and participated in a series of intervention group discussion workshops. The students were divided into two groups: experimental and control groups. The students in the experimental group numbered forty-seven (47) and those in the control group forty six (46) all perceived mathematics as a subject that cannot be attempted with ease. When treatment was administered to the experimental group they demonstrated a significant decreased score on anxiety through their answered questionnaire, After 4 weeks of re-test administration a significant difference in change of mathematics anxiety levels for students in the experimental group was recorded. Overall, this study found that systematic desensitization therapy had a direct relationship with reducing students' maths anxiety at a universal level to a more fluid perspective of intelligence when all parts of the body are consciously relaxed.

Systematic desensitization

Moses and Daniel (2008) conducted a study on students' mathematics anxiety in southern Nigeria. The study was aimed at finding out if peer group influence would have any impact on pupils' mathematics anxiety and whether there exist any significant correlation that is associated with negative influence in attitude of Peer group social interaction. One hundred and forty-three students in JSS2– SS1 participated in the study (68 boys and 75 females) in the age range of 15– 19 years. The instrument used for data collection was the maths anxiety scale by Richardson and Suinn (1972). The data were analysed using mean and analysis of

co-variance (ANCOVA). The findings showed that mathematics anxiety and peer group influence have been significantly correlated, indicating that high mathematics anxiety are associated with negative influence in attitude of Peer group social interaction.

In Austria a parallel study was conducted by Rothbaum (2000), worked on therapeutic treatments for reducing mathematics anxiety in undergraduate students. The study was based on finding out if students test performance could improve when self- report is administered immediately after the pre-test. Twenty one (21) test anxious undergraduate student's made-up the sample size (12 males and 9 females). Their ages ranged from19-24 years. They were exposed to two therapeutic treatments: Systematic desensitization and Cognitive modification treatment. These treatments were adopted to find out which technique was more effective in reducing mathematics anxiety in a two weeks counselling session. In the first week of the study, all the students were exposed to insight-oriented therapy to analyze the level of awareness of their anxiety-endangering thought. Through random selection, 11 students (6males and 5females) were placed in the Systematic desensitisation group and 10 students (6 males and 4 females) were placed in the cognitive modification group. Both groups were also exposed to coping imagery on how to handle anxiety and self-instructional training was given to attend to the task about oneself were also employed. Method of data collection was through the use of the Spielberger Two Component Anxiety Scale and Data was analysed using the mean of 20 and standard deviation of 7.2. Results after a period of 6weeks indicated that, the Systematic desensitization group was slightly more effective in reducing test anxiety of the students as assessed by (a) Test performance obtained in an analog test situation, (b) self-reports given immediately after post-treatment.

Apple, Billingsley and Schwartz (2005), compared individual and group versions of vicarious desensitization with direct systematic desensitization. The study was carried out using correlation survey design which seeks to determine what differences exist in decreasing

scores on anxiety using vicarious desensitization or direct systematic desensitization. They observed that, the variables that significantly correlated with adolescents' self-esteem included individuals behaviour towards peers and level of fear exhibited. Seventy three adolescents participated in the study comprising of thirty eight (38) females and thirty seven (37) males, with mean age as 18. They found that both approaches were equally effective in decreasing scores on a test anxiety measure and increasing performance on a reading test.

Dickinson and O'connell (2004) carried out a study on measures of reducing anxiety by adopting the systematic desensitization technique in Sierra Leone West-Africa. Their specific goal was to measure the level of anxiety in senior class performance of students in Sierra Leone and if the experimental group performed better in reducing students anxiety during test performance than the control group. It was made up of a sample size of 23 adolescents. (12males and 11females) age ranging from 17-19 years old. They studied specified variables such as sex and environment. Correlational survey was used to determine the relationship existing between the sex and environment of the selected adolescents. Their work was carried out in two groups. Group one adopted the treatment using desensitization technique while the second group was the control group. Students reported significantly more reduced test anxiety on two different measures of reducing test anxiety (r=-.21) and (r =-.10) in relation to the experimental group than those who were in the control group.

In another study conducted by Piane (2003) in Minnesota, USA, based on levels of test and anxiety traits, the study was aimed at comparing acceptance and commitment therapy and systematic desensitization in reducing co-morbid levels of test and trait anxiety on a group of Asian American teenagers. Participants included 53 college students made up of 27 boys and 26 girls with mean age as 24, all experiencing mathematics anxiety. Method of data collection was through administration of questionnaires to the students. They were treated individually for 6 weeks, with either acceptance and commitment therapy or systematic

desensitization. Statistical analyses indicated significant but, equivalent reductions in self-report measures of mathematics at eight (8) weeks follow-up. Both statistically and clinically it was observed that there were significant decrements in trait anxiety amongst the participants treated with systematic desensitization.

Oliha and Audu (2012) also conducted a study on effectiveness of contingency management and systematic desensitization in the management of truancy in schools. The purpose of the study was to determine the effectiveness of contingency management and systematic desensitization on the reduction of truancy among secondary school adolescents. Participants consisted of 144 students (72 males and 72 females) from four co-educational schools in Edo state Nigeria. ANOVA was used to test the effectiveness among the independent variables (contingency management and systematic desensitization) on truancy. Results of the study showed that systematic desensitization matched contingency management as effective treatments of truancy.

Looking specifically on anxiety reduction, the work of Ashcraft and Moore (2009) used systematic desensitization on 7th grade students in a study, to determine if breathing exercises and progressive muscle relaxation culminates with visualization to reduce students' level of anxiety in a high stress mathematics class and if the strategy had any apparent effect on the students' academic performance. The sample population used was 25 males and 23 females. Ages ranging from 12- 15yrs, with mean of 14 and SD of 6.3. Twenty four (24) students made up of (15 males and 9 females) were randomly selected to make up the experimental group who were specifically instructed to breath in and out severally. Once the feeling of anxiety was over-whelming, their sense of reasoning in solving the given mathematics problems. The control group was made up of the remaining 24 students (14 females and 10 males) who were left to perform their mathematics task all by themselves. Independent variables included sex, performance, humour and visualization. Using the t-test to analyze the

data from both the experimental groups and control groups specified as A,B,C and D, it showed that students in the treatment groups performed better in the mathematics high stress tasks when it was introduced than students in the control group. Also, measures of anxiety in the students from the control group correlated positively with their performance recorded on their scale evaluation of their level of trait and state anxiety. This was found to be their reason for poor performance which invariably leads to heightened anxiety as against the reduced anxiety for mathematics witnessed in the treatment group.

Counselling psychologists Egbochukwu, Obodo and Obadan (2008), carried out a study on the effect of Systematic Desensitisation (SD) therapy on the reduction of test anxiety on some Nigerian students in Lagos State, identified to be test anxious. The population of the study comprised all secondary school students in Lagos (South West area of Nigeria). Only co-educational senior secondary were used for the study. For the initial selection of schools, the technique adopted was the stratified random sampling technique. Three schools were randomly selected and three secondary independent variables; entry test anxiety level, sex and locus of control were used for the study. Entry test A 2x2x2 way factorial design was employed. For the students who were test anxious SD was found as an effective technique in the reduction of test anxiety. Entry test anxiety level of subjects was found to be significant on the level of reduction of test anxiety students. Sex had no significant effect on reduction of test anxiety of students. There was no significant interaction effect of therapy and secondary independent variables. However, there was a significant effect of entry test anxiety level and therapy at the end of the treatment.

Self-management

Leone and Hall (2003), worked on therapeutic treatments for autistic students in a school setting. They aimed at building self-confidence in them. The twenty eight (28) students who were autistic made up the sample size (12 males and 16 females). Their ages ranged from19-

24 years. They were exposed to two therapeutic treatments: self-management techniques and systematic desensitization technique. These treatments were adopted to find out which technique was more effective in reducing general anxiety in public speaking and social interaction in a six weeks counselling session with the students. In the first week of the study, all the students were exposed to insight-oriented therapy to analyze the level of awareness of their anxiety-endangering thought. Through random selection, 15 students (6males and 10 females) were placed in the self- management therapy group. They were also exposed to coping imagery on how to handle anxiety and self-instructional training was given to attend to the task about oneself. The second group made up of 12students (6 males and 6 females) were placed in the relaxation skills involving breath control. Data was analysed using mean of 18 and standard deviation of 7.2 Results after the stipulated period of 6weeks indicated that, students in the Self-management group exposed to self-analysis, self-monitoring and self-reinforcement in the course of therapy were slightly more effective in reducing their anxious behaviour when they made public speech and in their general interaction than those who were in the systematic desensitization group.

Moyela (2005) carried out a study on students' perseverance in the face of adversity. Her design was ex -poste-facto and a total of two hundred and four (204) senior secondary class one (SS1) students from the public and private secondary schools in Nsukka Local Government Education Authority constituted the sample size. Age range of the students was 15-17 years. She used the self-management technique to find out if students' optimism in carrying out academic tasks had an impact on their self-belief. Her findings indicated that, students who persevered in academic task and relied on the objective judgement of their class teachers, were known to have had greater optimism, reduced anxiety and they achieved more in terms of self-belief and self-concept. Instrument used was the humanistic models of

contribution. This was used to measure higher levels of the students' academic development and not their biological adjustment.

Nwankwo, Obi and Obi (2014) worked on study skill and self-management for inculcating self-belief in children and reducing test anxiety by their teachers. The study was carried out in Anambra state, Nigeria. The design for the study was a correlationa survey carried out using professional guidance counsellors in Anambra State, totalling 793 and sample size of 500 consisting 310 counsellors from secondary and primary schools in the state, 35 from tertiary institutions, 155 from post graduate students of Guidance and Counselling from Nnamdi Azikiwe University. A cluster sample technique, which involved high element of randomisation, was used. Their studies revealed that cognitive model and study skills which focused on how people know, understand and think in describing the patterns and regularities of the operation of ones' mind could be used to inculcate good self-management techniques among children and the adolescents. Although the work of Unachukwu and Nwankwo was carried out among children not adolescents and moreover they worked on strategies and not appraisals as their work was carried out using counsellors.

Overcoming mathematics anxiety and beliefs of inability is one of the greatest obstacles pupils report when faced with the prospect of studying mathematics. This research investigates how systematic desensitisation impacts on maths anxiety levels in pupils studying first year statistics. It examines whether a series of short interventions embedded in the curriculum can change a student's level of anxiety by moving them from a fixed (entity theorist perspective) to a more fluid view of intelligence, and whether this in turn reduces reported levels of overall mathematics anxiety.

A case study conducted at Danville Community College (Jones, 2001), followed two basic mathematics classes composed of fifteen (15) adolescent students per class who were taught

in the fall semesters of 1999 and 2000. The research attempted to determine whether clinical psychology theories, such as exploration and modification of dysfunctional perceptions, stress reduction and self-management techniques would in fact alleviate mathematics anxiety and lead to improved mathematics performance. The two classes met at the same time of day and used the same text and test resources. Anecdotally, the two classes expressed similar maths and test anxiety. The teaching strategy for the 1999 class was traditional whereby the teacher explained new mathematics concepts and the students performed practice questions and memorised the steps and rules required to solve the math problem. For the 2000 class, the teacher consciously tried to reduce maths anxiety by making the students use self-management techniques which included the students drawing up suitable time tables and analysing what they had studied all by themselves.

At the start of each class, the teacher will enthusiastically say "isn't it great we get to do math today!" Incentives were used for students to keep reviewing previously learned techniques and homework was left up to the individual, emphasising the need for students to discover their own learning style and determine how much practice they needed. The teacher used a casual approach to a new topic using some "wondering out loud" followed by appropriate models for finding a solution and discussing its real world application. The merits of each solution approach were noted and students were challenged to determine which one was more effective in reducing mathematics anxiety. The results showed that the class of 2000 had a higher percentage of satisfactory grades compared to the 1999 class. It is concluded that teaching strategies aimed at reducing maths anxiety was successful using the self-management techniques.

Summary of Review of Related Literature

Anxiety can cause complex emotional response which have behavioural, psychological, affective, physiological and cognitive aspects that, impedes the individual's ability to "constructively manage challenges, problems and opportunities". In case of mathematics anxiety, persons experiencing mild to moderate degree of arousal usually perform better than individuals with no anxiety or those with an overwhelming degree of anxiety.

The review of related literature was presented under the following major sections namely: conceptual framework, theoretical framework, theoretical studies and empirical studies.

The conceptual framework centred on the definition of major concepts such as systematic desensitization, self-management, anxiety and mathematics anxiety. Systematic desensitization involves getting the feeling of relaxation to dominate over the feeling of fear and anxiety for certain critical situation in a person's life. Self-management involves the pupils' use of his time, his abilities, his knowledge and the like.

Anxiety is viewed as a psychological and physiological condition that includes various components (behavioural, cognitive, emotional and genetic/semantic), which merge and result in feelings such as nervousness, panic and discomfort. Mathematics anxiety in this work has been mainly described as the "feeling of tension and anxiety that may interfere with manipulation of numbers and solving of mathematics problems in a wide variety of ordinary life and academic experiences". Systematic desensitization has been defined as a psychological condition in which people (pupils) experience intense fear, worry and concern during a test. Therapeutic treatment skill that reduces the learned link between anxiety and objects or situations that are usually producing anxiety such as intense fear, worry and concern when mathematics and other related issues are discussed. Also, self-management has been defined as the use of behavioural strategies by pupils to modify their own behaviour.

To provide theoretical framework for the study, five theories that are related to the present study were reviewed. Some of these theories include; State -Trait theory on Anxiety,

Classical conditioning theory, Social learning theory, Drive reduction theory and Self-determination theory. All the theories are well related to the study and they help in explaining some of the concepts, giving meaning to the study. Amongst all the theories however, state-trait anxiety theory by Spielberger, seems to be the most related as it clearly tries to account for the effect of mathematics anxiety on pupils' performance and attitude.

Under the theoretical studies, four theories relating to the present study were discussed. The studies tried to show the opinions and positions of many authors on the issues relating to anxiety, reducing mathematics anxiety, systematic desensitization and self-management. Many authors and researchers, whose works were reviewed, saw mathematics anxiety as a problem to students and pupils in the higher primary classes asserted the need to seek for an appropriate solution to the problem. Those in favour of systematic desensitization were of the opinion that, mathematics anxiety is as a result of learning from the environment and that a person could unlearn the abnormal behaviour through treatments involved in the technique.

Those in favour of self-management technique also showcased its advantages in pupils learning behaviour leading to the achievement of confidence in the mastery of mathematics learning through self-study, self-monitoring, self- analysis and in recording of one's own behaviour. Also in self-management the shifting of control from the counsellor to the pupil, thereby increasing the independence of the pupil in running the affairs that will suit individual purpose were highlighted.

The empirical studies examined several studies conducted by researchers were reviewed. The findings of the reviewed literature have indicated that, high level of mathematics anxiety are associated with negative outcomes, including impaired learning and outcomes in performing tasks, measurement and achievement as well as intelligence tasks. The findings from many of the reviewed studies indicated that systematic desensitization has positive effects in reducing

different forms of anxiety witnessed by individuals in different scenarios. The reviewed literature also indicated that, self-management techniques can be an effective technique in reducing maladaptive behaviour of students and pupils. Most of the studies found that the desired behaviour change occurred irrespective of the child's level of accuracy of self-study or self-analysis.

In trying to understand how the mechanism involving the treatment of mathematics anxiety is applied, many of these therapies and techniques have been tested singly and as combined techniques and many have been proven to be effective. The extensive use of these techniques has been used in treating different maladaptive behaviours such as fear and phobia in certain situations. Some of these interventions have been found effective in modifying mathematics anxiety levels of different affected individuals. Also, with the research recorded in this literature review, it is found that most of the works are carried out outside Nigeria and as such the generalization of the research as noted has often been hampered by small samples as well as different research setting and conditions thereby producing conflicting results. However, despite the above studies carried out by different researchers, none seems to address the effects of systematic desensitization and self-management techniques in reducing mathematics anxiety among primary five pupils. This research work therefore fills the above gap.

CHAPTER THREE

METHOD

In this chapter, the method and procedure used for the study/ investigation is discussed under the following sub-headings: Research design, Area of the study, Population of the study, Sample and Sampling Technique(s), Instrument for Data Collection, Validation of the Instrument, Reliability of the Instrument, Method of Data Collection, Experimental Training and Training Procedures, Control of Extraneous Variables, Method of Data Analysis.

Research Design

This study is a quasi-experimental research, comprising 3 groups and 2 treatment techniques making 6 cells. The rational in adopting the research design according to DeRue (2012) is that, a quasi-experimental design as an empirical study used to estimate the causal impact of an intervention on its target population and which also determines the effect of a treatment paradigm on a non-randomised sample.

Also, Morgan (2000) argued that, a quasi-experimental research design typically allows the researcher to control the assignments to the treatment conditions and could be used in a school setting where it is not always possible to use pure experimental designs. Quasi experimental designs might allow the researcher to have control over assignments to the

treatment condition by using some criteria other than random assignment (e.g., a cut-off score), to determine which participants receive the treatment, or the researcher may have no control over the treatment condition assignment and the criteria used for assignment may be unknown. In the context of this study a non-randomised pre-test – post-test and control group design was used.

The participants in this research design were made up of three groups from three co-educational schools. Two groups served as treatments while one group served as a control. The three groups were tagged; experimental group one, experimental group two and the control group.

Systematic Desensitization Technique (SD 84 used to treat participants in group I, self-management technique (SMT) was used in treating participants in group II, while the third group was the control group. With the control group, the treatment measure was centred only with the conventional method usually used by the class teacher in the mathematics class.

Table 1

A Non-randomised pre-test and post-test control group design

Group	Pretest	Research condition	Post-test
Experimental (1)	O_1	X_i (Treatment)	O_2
Experimental (2)	O_2	X_2 (Treatment)	O_2
Control	O_1	X_0 (Neutral Interaction)	O_2

O_1 Stand for the Pre-test which was given to all the pupils.

X_1 Stand for treatment 1 (Systematic desensitization technique) which was given to the experimental group 1

X_2 Stand for treatment 2 (self-management technique) which was given to the experimental group 2

X_0 Stand for conventional counselling which the researcher used with the control-group.

O_2 Stand for the Post-test which was given to both the experimental and the control group.

Area of the Study

The study was conducted in Oshimili South Local Government Area (LGA) in Delta State of Nigeria. The LGA has an area of 603km^{2}and a population of 149,603 based on the 2006 census report. The Oshimili South Local Government Area is made up of seventeen communities and the people of the area are mainly farmer, artisans, civil servants and traders. Geographically, it's a low land between unpronounced hills which qualifies it as a valley.

The educational structures are properly built as specified by the State Ministry of Education and located in serene areas within the communities of the Local Government Area. It is bounded in the East by Anambra State, in the South by Ndokwa East Local Government Area, in the North by Oshimili North Local Government Area and in the West, by Aniocha South Local Government Area. Many famous primary schools such as Dell international school, Asaba, known to promote the gains of early mathematics learning in pupils amongst others, is situated in Oshimili South Local Government Area of Delta State.

Again, Delta State is an oil producing state in Nigeria, situated in the region known as the Niger Delta. This becomes one major reason why mathematics which is a key subject in studying the sciences, is necessary for pupils to understand early because, it would create opportunities for them in the future in terms of increasing their career choices and employment opportunities.

Despite its numerous opportunities, the researcher has observed that many pupils still prefer art subjects like English and Christian Religious Knowledge (CRK) to mathematics as many

pupils find the figures in mathematics as anxiety provoking, while some try to cheat when mathematics test is going on in class. Against this backdrop the researcher decided to consider Asaba as a suitable area for this study.

Population of the Study

The population of this study was 2060 pupils. This comprised all the primary five pupils from the 163 co-educational primary schools, in Oshimili South Local Government Area of Delta State, that were recognised by the State Universal Basic Education Board (SUBEB). The reason for this was to enable the researcher decipher between responses of males and females as regards mathematics anxiety and to ascertain their interactive effect on treatment.

Sample and Sampling Technique

The sample size of the study consisted of 125 mathematics anxious pupils, in co-educational primary schools gathered through purposive sampling, using Abbreviated Mathematics Anxiety Scale (AMAS) Instrument. The procedures for selecting the sample size embodied the following major steps: Selecting the educational area to be used for the study, selecting the number of co-educational schools used for the study, selecting the actual number of schools used for the study and selecting the number of pupils used for the study. Concerning the educational area used for the study, the researcher randomly selected one out of the twenty five Local Government Areas in Delta State, Oshimili South Local Government Area, using the simple random sampling technique.

The second major step was the selection of the schools for the study. A pull of twelve (12) co-educational primary schools in Oshimili South Local Government Area, were identified as the schools with the highest number of poor performing mathematics primary five pupils.

The third step involved the selection of the actual schools used for the study: The schools considered, were those schools that had the highest number of pupils with low mathematics

scores in their mathematics examinations. Through the pupils' results, the researcher used purposive sampling technique to select the final three (3) schools.

Purposive sampling is a sampling technique whereby specific elements which satisfy some predetermined criteria are selected. Nworgu (2005) noted that, such criteria for selection are dependent on the researcher's judgement. Based on the above, the specific element used for the criteria was the class size, pupils' baseline score on class performance, serenity of the environment, the convenience of the researcher and the research assistants.

The fourth step involved the actual number of pupils that were used for the study. The actual sampling size for the study was one hundred and twenty five (125) pupils. It comprised the selected primary five pupils with very high scores on the Abbreviated Mathematics Anxiety Scale (AMAS).

The questions were structured on a 5 point rating scale: High Anxiety (5), quite some anxiety (4), moderate anxiety (3), some anxiety (2) and low anxiety (1). The three schools served as the experimental groups I and II, while the third school served as the control group.

Experimental group 1 was made up of 40 pupils using systematic desensitization. 42 pupils made up the experimental group 11 using self-management technique from the second school, while 43 pupils identified in the third school made up the control group and were taught using the normal conventional teaching method. These pupils made up the actual participants for the study as 125pupils.

The post-test was administered to the same pupils eight (8) weeks after the pre-test was administered.

Instrument for Data collection

The main instrument for data collection was the Abbreviated mathematics Anxiety Scale (AMAS) developed by Hopko, Mahadevan, Bare and Hunt (2003) but, it was revalidated in Nigeria by Adebule (2003). AMAS has been adapted to Nigerian context and has been used

extensively in Nigeria. Abbreviated Mathematics Anxiety Scale (AMAS) is a self-report psychometric scale which has been developed to measure individual differences in mathematics anxiety as a situation specific trait. The test is one-paged and contains nine items to suit the age bracket of the higher primary school children who might lose concentration when presented with lengthy questionnaires. AMAS is based on a five (5) point rating scale ranging from; 1= low anxiety, 2= some anxiety, 3=moderate anxiety, 4= quite some anxiety and 5 = high anxiety.

The respondents were required to indicate how anxious they felt during the event specified in the questionnaire. In addition to measuring individual differences in mathematics anxiety and prowess in test situation, the AMAS subscale assessed self-doubt as major component of mathematics anxiety.

Responses were scored according to the specification on the AMAS manual. Scores that were above the Nigerian criterion norm mean score M = 21.1 and the Standard Deviation SD = 7.0 indicated the presence of mathematics anxiety and scores below this showed no problem of mathematics anxiety. Only pupils with mathematics anxiety were included in the two treatments. Gender-effect identified according to the AMAS manual was as follows: females M=21.9 and SD=6.9 while males M=19.5 and SD=6.9. The pupils who scores below these scores were not assumed to be mathematics anxious and therefore were not included in the study.

Validity of the Instrument

The instrument Abbreviated mathematics anxiety scale (AMAS) was adopted by Hopko et al in 2003 from the original version of the Mathematics Anxiety Rating Scale (MARS) developed by Richardson and Suinn (1972). The instrument AMAS was revalidated in Nigeria by Adebule (2003). The researcher therefore adopted the AMAS and did not have to do any validation.

Reliability of the Instrument

Good psychometric properties have been reported as regards the Abbreviated Mathematics Anxiety Scale (AMAS). The internal consistency co-efficient of 0.93 had been reported for AMAS total scores, Hokpo et al, 2003). Additionally, AMAS has good internal consistency reliability among sample of primary school pupils and secondary school students. Reliability co-efficient alpha of 0.91 and above had been reported for both male and female sample. Test score stability over 2-8 weeks test re-test interval ranged from 0.82 -0.83 for AMAS Hokpo et al, 2003). The Co-efficient of reliability obtained from the Nigerian samples ranges from 0.78 to 0.80 (Adebule, 2003).

Method of Data Collection

The researcher used three guidance counsellors who served as research assistants. The importance of the research was clearly explained to the research assistants. This enlightenment programme with the selected counsellors helped the researcher in administering the questionnaire to the pupils, in the final three selected schools in the Local Government Area. Under the supervision of the researcher, the three selected counsellors worked independently and moving from one school to the other at a steady pace of time. The first step taken by each of the counsellors in the schools visited was to get introduced to the head teacher. The data collected using the Abbreviated Mathematics Anxiety Scale (AMAS) was administered to the pupils both in the experimental groups and in the control group and the scores analyzed by the researcher to determine the mean scores. The mean gain and mean loss scores were then used to ascertain the relative effectiveness of Systematic desensitization and Self-management techniques on mathematics anxiety of the pupils.

Experimental Training and Treatment Procedure

In the primary schools used, the researcher obtained the consent of the school head-teachers. The primary school pupils (primary five) who participated in the study were identified in their respective schools. Each of the schools with high level of mathematics anxiety constituted a group. Two experimental groups and the third school was used as the control group. Participants in the experimental groups were exposed to Systematic desensitization technique and Self-management technique while the pupils in the third group were exposed to the regular conventional method as stated in the primary five scheme of work for mathematics. Based on their young ages, they participated in 40minutes sessions twice per week for eight consecutive weeks.

One technique was used for two sessions per week, to enable the pupils master the techniques and for easy adoption to the mathematics programme. Fifteen minutes into the programme, the researcher presents the mathematics training package to the pupils with adequate explanations. This was done to enable them apply the techniques learnt to the mathematics concepts that were taught

Training of Research Assistants

The researcher organised a two day orientation programme for the research assistants to orientate and acquaint them with necessary skills in the use of systematic desensitization and self-management techniques on the pupils, reducing their mathematics anxiety. The training was necessary because it enabled the researcher and the research assistants to take decisions on certain important issues as to ensure uniformity. Issues like:

1. The role of research assistants.
2. Deciding on the units of the instruments to be used.
3. The criteria for deciding when pupils must have mastered the topic.
4. Guide the pupils' activities.
5. Preparatory class time table drawn.

6. Incentive decision in terms of reward/commendation.
7. Specific objectives for the treatment agreement.

The research assistants who are regular school guidance counsellors, having equal counselling experience and assumably equal potentials were from the sampled schools.

Control of Extraneous Variables

Extraneous variables are independent variables which could exert some influences over the independent variables but are not themselves studied(Nworgu, 2006). The researcher tried to identify the extraneous variables and controlled them. The variables are thus:

Class interactive effect

Separate schools were used for different learning techniques and control group. This was to control class interactive effect, among experimental groups and between control and experimental groups. Non was aware of what transpired in the other schools.

School Location Effect

Schools in Oshimili South metropolis Asaba in Delta State, with similar environments were used: Dell International School, Uzoigwe Primary School and Okwe Primary School.

Effect of Pre-test and Post-test

The treatment lasted for eight weeks of two periods per week. It was assumed that by the end of the treatment, the effect must have materialised hence the pre-test by the first week and the post-test by the eight week. The gap in administering of pre-test and that of the post test was long enough to avert any effect of pre-test on post-test.

Experimental Mortality Effect

The moderate time gap of eight weeks reduced the effect of experimental mortality. Usually, illness, pupils dropping out, death or even when the teachers are transferred is always

rampant when the experiment lasts for a longer period. The moderate time gap also helped in the consistency in applying the step-by-step approach applicable in the systematic desensitization technique. This made the lesson interesting and pupils were sensitized by the self-management technique learnt, to reduce the anxiety they witnessed when in the mathematics class.

Teacher Quality Effect

The Guidance Counsellors with the same qualifications, similar experience and potentials were used as control for teacher's quality effects. The research assistants were commonly trained in the use of the AMAS questionnaire by an expert (the researcher). They were also provided with detailed instructions for conducting learning activities in both control and experimental groups. Incidentally, the only difference was that the pupils in the experimental groups completed their techniques in reducing mathematics anxiety while the pupils in the control group completed theirs under normal classroom environment and supervision.

The Hawthorne Effect

The present study is quasi-experimental and was designed and executed in accordance with certain strategies that would reduce much of contamination by extraneous variables. This includes the Hawthorne effect, which is an experimenter effect. According to Macefield (2007), subjects react to novelty or change other than specifics in a treatment programme. This effect can be controlled if treatment is carried out over a long period of time.

When pupils suspect they are being used for a particular study, it may lead to faking their behaviours and they may resent any treatment or may become inattentive to given instructions. Some might feel rejected, inferior or even superior to others. This could affect the researcher's true result.

Method of Data Analysis

The Abbreviated Mathematics Anxiety Scale (AMAS) after eight weeks of treatment was re-administered on all the participants in both the experimental group and the control group. This was regarded as the post-test. The results of the post-test was collated by the research assistants and given to the researcher for final analysis.

The data relating to the research questions were analyzed using the mean and, data relating to the null hypotheses were analyzed using the Analysis of Co-variance (ANCOVA), while the table was summarized using the SPSS 6^{th} version. The completed instruments were scored following the scoring instructions provided by the AMAS manual. Scores that were above the Nigerian norm relating to component analysis as specified in the manual showed that, pupils who scored 21.9 for females and 19.5 for males indicated mathematics anxiety while the scores below this range, showed no such problem. The school differences were not expected to be significant and the schools used were co-educational schools in Oshimili South Local Government Area, seen to possess more similarities than differences.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

In this chapter, the data collected from the field for this study were analyzed and the summaries were presented in tables to highlight the findings. The presentation was sequential, starting with the answers to the research questions and then the testing of the null hypotheses.

Research Question 1

What is the effect of systematic desensitization counselling technique on mathematics anxiety among primary school pupils, when compared with conventional method, using differences between pre-test and post-test mean scores. The tables generally indicate that, the mathematics anxiety entry level number for this study is between 0 and 50. Where 0 is no mathematics anxiety at all and 50 is the severest maths anxiety possible. This was used to to assess perceived general mathematics anxiety levels.

Answer to this research question is presented in Table 2.

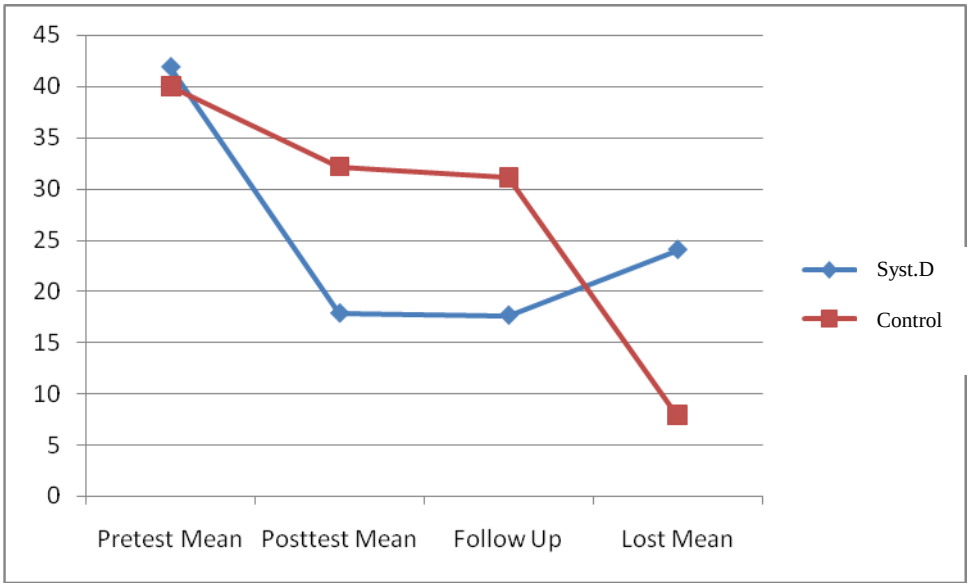
Table 2

Pretest and Posttest mathematics anxiety mean scores of pupils treated with systematic desensitization and those in the control group

Source of Variation	N	Pretest	Posttest	follow up	Lost Mean	Remark
Syst.Dest.Tech	38	41.89	17.84	17.63	24.05	Effective
Control	40	40.05	32.20	31.12	7.85	

Table 2 indicates that, the pupils treated with systematic desensitization technique had pretest mean score of 41.89 and posttest mean score of 17.84 with lost mean 24.05 in their test anxiety, while the pupils in the control group who received conventional teaching had pretest mean score of 40.05 and posttest mean score of 32.20 with lost mean 7.85 This may be as a

result of the treatment administered to the pupils. It was therefore revealed that systematic desensitization technique was more effective in reducing the pupils' mathematics anxiety.



Research Question 2

What is the effect of self-management counselling technique on mathematics anxiety among primary school pupils, when compared with conventional method, using differences between pre-test and post-test mean scores?

Answer to this research question is presented in Table 3.

Table 3

Pre-test and Post-test mathematics anxiety mean scores of pupils treated with self-management technique and those in the control group

Source of Variation	N	Pretest	Posttest	follow up	Lost Mean	Remark
Self-Mgt Tech.	40	41.52	19.30	19.25	22.22	Effective
Control	40	40.05	32.20	32.08	7.85	

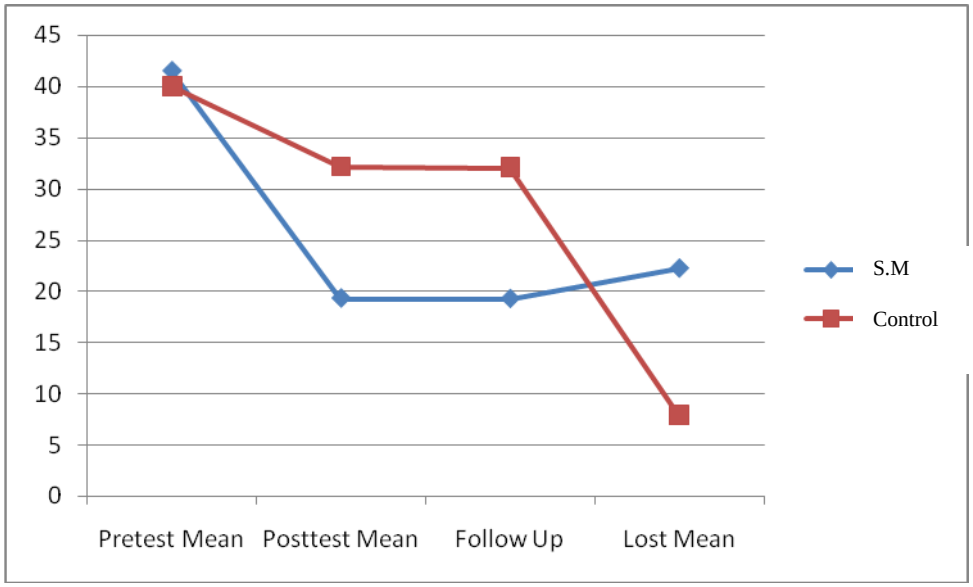


Table 3 shows that the pupils treated with self-management technique had pretest mean score of 41.52 and posttest mean score of 19.30 with significant lost mean of 22.22 in their mathematics anxiety, while the pupils in the control group who received conventional teachings had pre-test mean score of 40.05 and posttest mean score of 32.20 with insignificant lost mean 7.85. It was also established that, the follow up results indicated a steady decline in the anxiety pupils faced in mathematics therefore, self-management technique is effective in reducing pupils' mathematics anxiety.

Research Question 3

What is the difference in the relative effectiveness of systematic desensitization technique, when compared to self-management technique, using pre-test and post-test mathematics anxiety mean scores?

Answer to this research question is presented in Table 4.

Table 4

Pretest and Posttest mathematics anxiety mean scores of pupils treated with systematic desensitization self-management techniques

Source of Variation	N	Pretest	Posttest	follow up	Lost Mean	Remark
Syst.Dest.Tech.	38	41.89	17.84	17.76	24.05	more effective
Self-Mgt.Tech.	40	41.52	19.30	19.23	22.22	

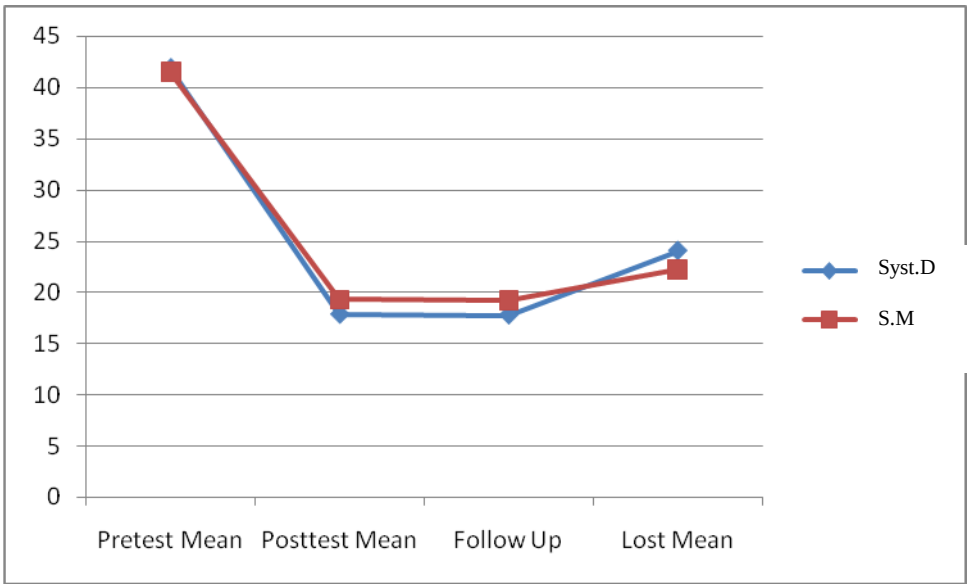


Table 4 indicates that the pupils treated with systematic desensitization technique had pretest mean score of 41.89 and posttest mean score of 17.84 with lost mean 24.05 in their test anxiety with 38 pupils tested and the pupils treated with self-management technique had pretest mean score of 41.52 and posttest mean score of 19.30 with lost mean 22.22 in their mathematics anxiety. Therefore systematic desensitization technique is more effective in

reducing the pupils' mathematics anxiety, when calculated in terms of percentage difference average scores.

Research Question 4

What is the effect of systematic desensitization counselling technique on mathematics anxiety among male and female pupils, using differences in pre-test and post-test mean scores?

Answer to this research question is presented in Table 5.

Table 5

Pretest and Posttest mathematics anxiety mean scores of male and female pupils treated with systematic desensitization technique

Source of Variation	N	Pretest	Posttest	follow up	Lost Mean	Remark
Male	18	41.67	17.67	17.62	24.00	
Female	20	42.00	18.00	17.87	24.00	No difference

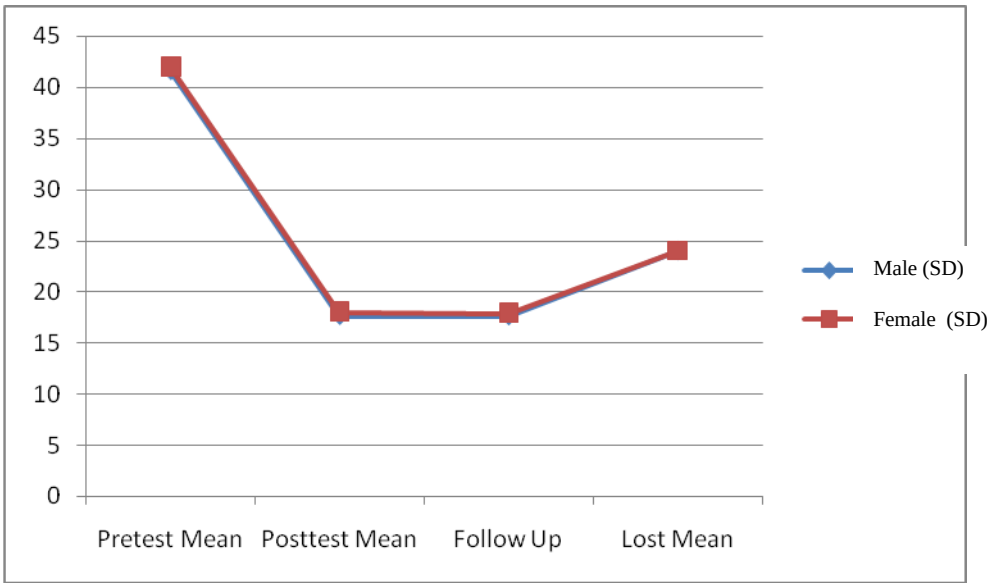


Table 5 indicates that male and female pupils treated with systematic desensitization technique had pretest mean score of 41.67 and posttest mean score of 17.67 with lost mean 24.00 in their mathematics anxiety, while the female pupils in the control group had pretest mean score of 42.00 and posttest mean score of 17.00 with lost mean 24.00. Therefore

systematic desensitization has equal effects in reducing the male and female pupils' mathematics anxiety.

Research Question 5

What is the effect of self-management counselling technique, on mathematics anxiety among male and female pupils, using differences in pre-test and post-test mean scores?

Answer to this research question is presented in Table 6.

Table 6

Pre-test and Post-test mathematics anxiety mean scores of male and female pupils treated with self-management technique

Source of Variation	N	Pretest	Posttest	follow up	Lost Mean	Remark
Male	20	41.05	19.15	19.12	21.90	
Female	20	42.00	19.45	19.42	22.55	Rel. More Effective

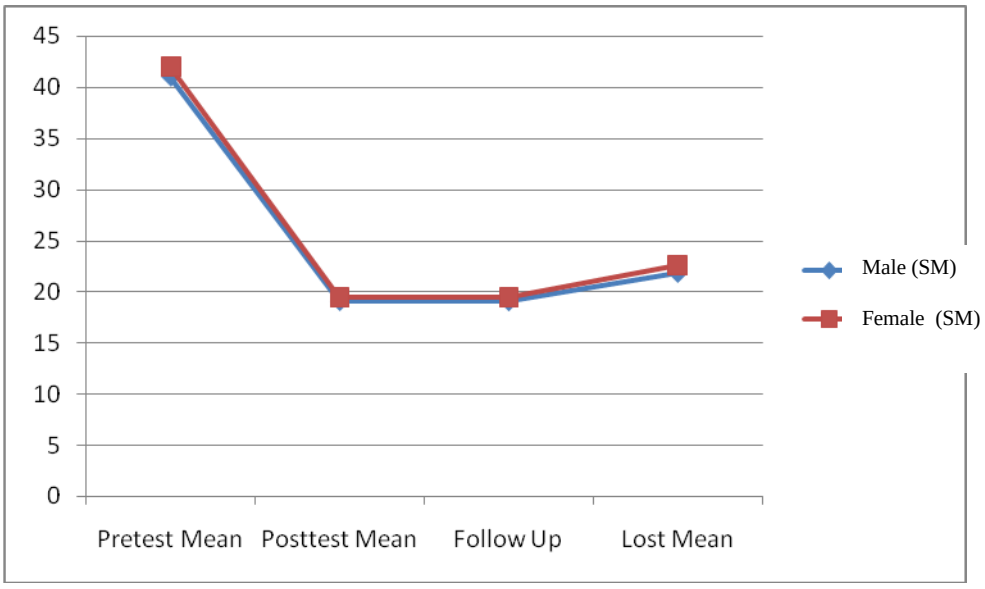


Table 6 reveals that male pupils treated with the self-management technique, had pretest mean score of 41.05 and posttest mean score of 19.15 with lost mean 21.90 in their mathematics anxiety, while the female pupils' in the group had pretest mean score of 42.00 and posttest mean score of 19.45 with lost mean 22.55. With results shown in the follow up

test conducted a week later, a consisted result was recorded with that of the post test. Therefore, results showed that, self-management technique is more effective in reducing the female pupils' mathematics anxiety than in male pupils

Testing the Null Hypotheses

Hypothesis 1

There is no significant difference in the pre-test and post-test mathematics anxiety mean scores of pupils treated with systematic desensitization technique when compared with those in the control group.

Data for testing this hypothesis are presented in Table 7

Table 7

ANCOVA on the posttest test anxiety mean scores of pupils treated with systematic desensitization and those who received conventional counselling (control group).

Source of Variation	SS	Df	MS	Cal.F	Crit.F	P≥0.05
Corrected Model.	4045.042	2	2022.521			
Intercept	53.931	1	53.931			
Pretest	27.777	1	27.777			
Treatment Groups	3709.285	1	3709.285	131.74	3.98	S
Error	2111.676	75	28.156			
Residual	55710.000	78				
Corrected Total	6156.718	77				

In Table 7, it was observed that at 0.05 level of significance, 1 df numerator and 77df denominator, the calculated F 131.74 is greater than the critical F 3.98. Therefore, the first null hypothesis is rejected. So, the effect of systematic desensitization technique in reducing primary school pupils' mathematics anxiety is significant when compared with those in the control group.

Hypothesis 2

There is no significant difference in the effect of self-management technique in reducing primary school pupils' mathematics anxiety when compared with those in the control group using their mean scores.

Data for testing this hypothesis are presented in Table 8.

Table 8

ANCOVA on the posttest test anxiety mean scores of pupils' treated with self-management technique and those who received conventional counselling.

Source of Variation	SS	Df	MS	Cal.F	Crit.F	P≥0.05
Corrected Model.	3416.597	2	1708.298			
Intercept	23.467	1	23.467			
Pretest	88.397	1	88.397			
Treatment Groups	3365.443	1	3365.443	192.75	3.97	S
Error	1344.403	77	17.460			
Residual	57806.000	80				
Corrected Total	4761.000	79				

Table 8 shows that at 0.05 level of significance, 1df numerator and 79df denominator, the calculated F 192.75 is greater than the critical F 3.97. Therefore, the second null hypothesis is rejected. So, self-management technique is significantly effective in reducing primary school pupils' mathematics anxiety when compared with those in the control group.

Hypothesis 3

There is no significant difference in the effectiveness of systematic desensitization in reducing primary school pupils' mathematics anxiety when compared with those treated with self-management technique using their mean scores.

Data for testing this hypothesis are presented in Table 9

Table 9

ANCOVA on the posttest mathematics anxiety mean scores of Pupils treated with systematic desensitization technique and those who received self-management technique

Source of Variation	SS	df	MS	Cal.F	Crit.F	P≥0.05
Corrected Model.	103.387	2	51.694			
Intercept	3.502	1	3.502			
Pretest	61.968	1	61.968			
Treatment Groups	53.813	1	53.813	3.25	3.98	S
Error	1821	75	24.286			
Residual	28880.000	78				
Corrected Total	1924.872	77				

Table 9 shows that at 0.05 level of significance, 1df numerator and 77df denominator, the calculated F 3.25 is less than the critical F 3.98. Therefore, the third null hypothesis is rejected. So, there is slight significant difference in the effectiveness of systematic desensitization and self-management techniques in reducing primary pupils' mathematics anxiety.

Hypothesis 4

There is no significant difference in the effectiveness of systematic desensitization technique in reducing mathematics anxiety of male and female pupils.

Data for testing this hypothesis are presented in Table 10.

Table 10

ANCOVA on the posttest test anxiety mean scores of male and female pupils treated

with systematic desensitization technique

Source of Variation	SS	Df	MS	Cal.F	Crit.F	P≥0.05
Corrected Model.	1.053	2	526			
Intercept	8.660	1	8.660			
Pretest	0.000	1	.000			
Gender	1.015	1	1.015	0.027	4.11	NS
Error	1294.000	35	36,971			
Total	13392.000	38				
Corrected Total	1295.053	37				

Table 10 showed that at 0.05 level of significance, 1df numerator and 37df denominator, the calculated F 0.03 is less than the critical F 4. 11. Therefore, the fourth null hypothesis is upheld. So, there is no significant difference in the effectiveness of systematic desensitization technique in reducing mathematics anxiety of male and female pupils.

Hypothesis 5

There is no significant difference in the effectiveness of self-management technique in reducing mathematics anxiety of male and female pupils.

Data for testing this hypothesis are presented in Table 11.

Table 11

ANCOVA on the posttest mathematics anxiety mean scores of male and female pupils treated with self-management technique

Source of Variation	SS	Df	MS	Cal.F	Crit.F	P≥0.05
Corrected Model.	85.271	2	42.636			
Intercept	16.226	1	16.226			
Pretest	84.371	1	84.371			
Gender	2.209	1	2.209	0.16	4.09	S
Error	503.129	37	13.598			
Total	15488.000	40				
Corrected Total	588.400	39				

Table 11 indicates that at 0.05 level of significance, 1df numerator and 39df denominator, the calculated F 0.16 is less than the critical F 4.09. Therefore, the fifth null hypothesis is accepted. So, there is no significant difference in the relative effectiveness of self-management technique in reducing mathematics anxiety of male and female pupils.

Summary of the Findings

From the analysis, the following findings were made:

1. Systematic desensitization technique is effective in reducing the pupils' mathematics anxiety.
2. Self-management technique is effective in reducing the pupils' mathematics anxiety.
3. Systematic desensitization technique is relatively more effective in reducing the pupils' mathematics anxiety.
4. Systematic desensitization has equal effects in reducing the male and female pupils' mathematics anxiety.

5. Self-management technique is more effective in reducing the female pupils' mathematics anxiety than in male pupils.
6. The effect of systematic desensitization technique in reducing primary school pupils' mathematics anxiety is significant when compared with those in the control group.
7. Self-management technique is significantly effective in reducing primary school pupils' mathematics anxiety when compared with those in the control group.
8. There is no significant difference in the effectiveness of systematic desensitization and self-management techniques in reducing primary school pupils' mathematics anxiety.
9. There is no significant difference in the effectiveness of systematic desensitization technique in reducing mathematics anxiety of male and female pupils.
10. There is no significant difference in the effectiveness of self-management technique in reducing mathematics anxiety of male and female pupils.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

This chapter discussed the following:

Discussion of the findings, with reference to posed research questions and hypotheses.

Implication of the findings

Conclusion

Recommendations

Limitations of the Study

Suggestions for further studies

Summary

Discussion on the Findings

The major findings of this study are discussed under themes in line with the main purpose of the study, which sought to determine the means of reducing primary five pupils' mathematics anxiety. The discussion is presented under the following sub-headings:

The effects of systematic desensitization technique,

The effects of self-management technique and comparing the relative effectiveness, of systematic desensitization and self-management techniques.

Effects of systematic desensitization technique

The analysed data from the findings of this study indicates that, amongst primary five pupils, the use of the systematic desensitisation technique is effective in reducing mathematics anxiety. This is also based on the earlier findings of Dickinson and O'Connell (2004), whose results support systematic desensitization (SD) as a treatment technique that can reduce mathematics anxiety witnessed by pupils. It also corroborates with some other findings

carried out by Oliha and Audu (2012), Ashcraft and Moore (2009), McLeod (2008) and Allen (2011) the step-by-step approach skill embedded in the technique could help in solving the debilitating effect the anxious individuals would have on cognition and reduce anxiety.

Also, the findings are considered with respect to the first hypothesis in chapter 1, which states that, there will be no significant difference in the effects of reducing mathematics anxiety of pupils using systematic desensitization and those in the control group. This is rejected. The rejection of this hypothesis thus leads to the first conclusion suggesting that therapeutic intervention procedures would be effective in reducing mathematics anxiety. Also the results from the analysed data further indicated that there was a significant difference shown through the calculated F 131.74, found to be greater than the critical F 3.98 as depicted on table 6 above. It was therefore considered that systematic desensitization is significant in reducing pupils' mathematics anxiety.

Effects of self-management technique

Findings from the data analysed showed that self-management technique has great effects on the reduction of mathematics anxiety among primary school pupils. The Previous related research findings from Leone and Hall (2003), Moyela (2005) and Nwankwo, Obi and Obi (2014) confirmed this study. They showed that the use of self-instructional training, self-analysis, self-monitoring and self–study increased the pupils' ability in reducing anxiety witnessed when mathematics is presented.

Based on the findings of this study, self-management technique is assumed as having some positive effects in reducing mathematics anxiety of pupils.

Also, the result from the analysed data as shown in table 7further indicated that the mean score of participants in the treatment group was found to be significantly different when compared with those in the control group. The result revealed that the calculated F192.75 is

greater than the critical F 3.97. This finding indicated that self-management technique significantly reduce mathematics anxiety in pupils.

Comparing the effect of systematic desensitization and self-management techniques on male and female pupils, the results from the data analysed on table 4 indicated that both systematic desensitization and self-management techniques had equal effect in reducing the male and female pupils' mathematics anxiety with both possessing the same level of lost means at 24.00. This finding confirms the research findings of Miller and Bishel (2004) that both the males and females strive for equality in the present mathematics world of learning. Also, in this study, self-management technique was found to have more effects in reducing mathematics anxiety among the females. This finding also confirm the works of Moses and Daniel (2008) that females are striving better in the science world when they begin to tell themselves that they can be achievers at every sphere of life like their male counterparts.

Based on these findings, it could be argued that girls are beginning to embrace
Mathematics as a result of the therapeutic intervention like the boys and understand the need for career choice in the competitive world of today.

Comparing the different effects of systematic desensitization and self-management techniques

Results from the analysed data showed that the two treatment techniques systematic desensitization and self-management techniques have great effects in reducing mathematics anxiety of primary school pupils. However, based on the results established in table 4, it showed that the post-test mean of 17.84 was less than pre-test mean of 41.89 with a mean loss of 24.05 for systematic desensitization technique and a post-test mean of 19.30 less than the pre-test mean of 41.52 was established with a mean loss of 22.22 in the self-management

technique. This showed that in this study, systematic desensitization technique had more effects in reducing mathematics anxiety of pupils in primary school.

This findings that systematic desensitization is superior to self-management technique in reducing pupils' anxiety contradicts the results reported by Leone and Hall (2003)who found self-management to be more superior to systematic desensitization in dealing with anxiety students faced with public speaking and social interaction. It however gives some support to the findings of Egbochuku (2005) that systematic desensitization alone and not in combination of behavioural approach is more superior.

Possible explanation for the superiority of systematic desensitization to self-management in reducing mathematics anxiety in this study could be traced to the nature of pupils. Systematic desensitization being used is observable and can be felt hence pupils were probably much more able to put its skill to use and thus report lower post-traumatic mathematics anxiety. This possibility becomes fairly strengthened when self-management which is a semantic approach per se has less effect than systematic desensitization.

Yet another possible explanation for the superiority of systematic desensitization to self-management might be due to the fact that, pupils in this culture have a strong negative emotional reaction towards mathematics as a result of the general belief that mathematics is very difficult. Therefore, systematic desensitization is seen to have more effects since it is a technique that ensures relaxation and removes tension because, one cannot be relaxed and tensed at the same time. As such, is it viewed as an emotional reduction approach as compared to self-management technique that has to do with talking to self, even if the pupils concerned are not mentally relaxed to imbibe the given mathematics concepts.

As stated by Strumpf and Foder (2003), pupils who are guided properly to successfully go through the stages of systematic desensitization have their anxiety for the subject reduced to

the barest minimum thereby giving room for proper learning and understanding while the subject is being taught.

Implication of the Findings

The present study has some implications for counselling practice, personality and the educational system.

First and foremost, it provides useful links between theory and practice. The theoretical propositions behind the various treatment techniques have thus been tested to see how effective they are. Mathematics anxiety as shown in this study is amendable to treatment particularly systematic desensitization which may result in improved mathematics learning as well. This study for example showed that pupils' mathematics reduction in performance had significant effect on mathematics anxiety.

The implication of this is that, pupils with low level of mathematics understanding will find it more difficult to acquire the necessary technique that will be relevant in reducing mathematics anxiety and so will require more intensive exposure and training in the therapeutic technique than high mathematics achievers.

Another implication of this finding is that, in formulating programmes for reducing mathematics anxiety, characteristics such as sex factors, vocational choice and interest should be taken into consideration. Since it was found in the present study that sex factor had significant effect on mathematics anxiety, it was also found that, systematic desensitization had equal effects in reducing pupils' mathematics anxiety. However, with self-management technique, female pupils were found to adopt the effects better to reduce the anxiety they witness when presented with mathematical problems. It will therefore be more challenging to reduce mathematics anxiety in male pupils using the self-management technique.

Also when pupils are equipped with appropriate behavioural techniques, they are likely to adopt realistic and learning styles that will assist them adjust to college school work. The results that were obtained from this study has proven that due to the intervention techniques adopted, results geared towards enhancing the pupils' mathematics performance was achieved. Teachers also with the use of the techniques will spend fewer lecturing hours because the pupils' involvement level in class work will be higher.

Educational system

The study is a useful indication of how to reduce the rate of pupils making wrong carrier choices. Since this is one of the causes, it would means that counselling in schools is a necessity because, this will serve as educational insurance to guarantee that individuals with peculiar mathematics problems are not abandoned in class or submerged with the belief that they cannot do well in subjects that are mathematics related.

In terms of methodology, different results found that different scales used to measure the same variable are significant. They showed that studies should continue to use multiple criteria because it may be that different techniques differently affect the various response systems.

Furthermore, the nature of anxiety as a major aspect of personality and general behaviour is further exposed. The different results obtained with mathematics anxiety and mathematics attitude all show the multi-dimensions of anxiety as a personality variable.

Conclusion

Based on the findings of this study, the following conclusions were made;

1. The higher scores showed by the pupils in the pretest mean scores indicated the presence of mathematics anxiety among pupils.
2. Anxiety exhibited by pupils can be reduced with both systematic desensitization and self-management techniques.
3. Therapy effects was shown by the two techniques but in varied degrees, and the relative effectiveness retained.
4. Self -management technique was found to possess more positive effects amongst female pupils' who were known to be mathematics anxious, than their male counterparts after the administration of the instrument Abbreviated Mathematics Anxiety Scale within a period of eight weeks.

In all, the effects of mathematics anxiety on primary five pupils cannot be over emphasised based on several reviews carried out by authors and researchers. This implies that the techniques used are vital constituents in reducing anxiety of mathematics in pupils in Oshimili South Local Government Area of Delta State.

Recommendations

The following recommendations are made, based on the findings of this study:

1. In every educational institution counselling should be clearly inculcated as an integral part of the school curriculum. This will boost the belief of 'self' the pupils and students would have when exposed to test situations particularly in mathematics.
2. The two techniques used in this study: systematic desensitization and self-management techniques should be adopted by school counsellors and classroom teachers. For example, pupils could be asked to quietly stand up an breath in as they close their eyes for about 2minutes and relax all their body parts like the neck muscles, fingers and the leg muscles before the start of a mathematics class or pupils

should be made to make positive self-statements like “I love mathematics” and, “I can achieve if I put my mind to understanding the teachings by my class teacher”.

3. The counselling unit and school welfare development should liaise with the Ministry of education to organize workshops, seminars targeted at training and retraining counsellors in the use of behaviour modification techniques. This will enable them to render effective assistance to pupils with behaviour problems.
4. Counsellors should apply systematic desensitization and self-management techniques on mathematics anxious pupils, as they have been proven to be effective.

Limitations of the Study

Although concerted effort was made to prevent interference of extraneous variables that might contaminate the study through adequate randomization and necessary experimental control, it was impossible to remove inter subject differences, such as their personality, cognitive and socio-economic background, since these were not usually removed through randomization. Therefore, statistical controls were used to equate such inter-subject differences which are minimal.

Suggestion for Further Research

1. The researcher is of the opinion that the facilitatory component for reducing mathematics anxiety could further be experimented to see to what degree its effects can help reduce pupils’ mathematics inability and increase pupils’ understanding for the subject.
2. To be more successful, it seems imperative that the two adopted techniques be used over a long period of time. Also longer and better training of teachers in the use of these techniques should be carried out.

3. These techniques need to be studied in an environment that is more suitable than that created by a research study as this. Under such conditions, may be the two techniques investigated here might contribute to a better reduction of mathematics anxiety amongst our learners.
4. There is also a need to use measures other than the stated mathematics scales of measurement for assessing low mathematics performing pupils. This could be done through their oral presentation and even through their daily classroom performance in the mathematics class.
5. This study is only a pioneer attempt to explore the wide range of problems concerned with finding effective treatment techniques that will be more effective in reducing mathematics anxiety among Nigerian pupils with different characteristics. This possible interaction of some other individual differences such as motivation, interest, cognitive styles and vocational choice on the effects of these techniques should be further researched into.
6. Finally, the research does not pretend to have exhausted all areas of knowledge in this field of investigations. Based on this, the study can be extended to different samples such as students in the secondary school, universities, polytechnics or colleges of education.

REFERENCES

Abiam, P.O., & Odok, J.K. (2006). Factor in students' achievement in different branches of secondary school mathematics. *Journal of Education and technology. 1 (1),* 161- 168.

Adebule, S.O. (2003). The development of an anxiety rating scale in mathematics for Nigerian Secondary schools. *Journal of National Assessment for the Advancement of Knowledge, 7(2),* 54-57.

Adeola, A. O., & Adedipe, N.O. (2003). Coping skills used in the in the treatment of test anxious students. *Nigerian Journal of Educational Psychology, 2 (1).* Retrieved from www.ajaol.info/ *1(5),* 16-18.

Adeyegbe, S.O. (2000) Mathematics competence as a predictor of performance in solving chemical arithmetic problems at ordinary level. *Journal of Research in curriculum,* special edition, *2*,23-30.

Akca, F. (2011). The relationship between test anxiety and learned helplessness. *Social Behavioural and Personality, 39(1),* 101 – 112.

Akinsola M.K., & Tella A. (2003) Effectiveness of individualistic and co-operative teaching strategies in learning geometry and problem solving in mathematics among Junior Secondary Schools, Nigeria.

Anagbogu, M.A. (2004) Counseling in Schools: The implications of Changing Students Antisocial Behaviour.*Journal of Counseling and Communication, 4(1),* 118 -124.

Anchor, E. E., Imoko, B.l., & Ajai, J.T. (2010). Sex Differentials in Students Achievement and Interest in Geometry Using Games and Simulations Technique. Necatibey Faculty of Education, *Electronic J. Science Mathematics Education, 4(1),*1-10.

Anih, A.U. (2002). Effect of Sequencing the Methods of Teaching Quadratic Equation of Students Achievement and Retention. M.Sc (ed.) *2(3)* 110-119.

Apple, A, L., Billingsley, F., Schwartz, I. S. (2005). Effects of vicarious desensitization on complement giving behaviours of children with high functioning. ASD. *Journal of positive behaviour interventions, 7 (1),* 33-46.

Ashcraft, M.H., & Kirk E.P. (2001).The Relationships among Working Memory, Mathematics Anxiety and Performance. *Journal of Experimental Psychology*. General *130*: 224-237

Ashcraft, M.H., & Moore, M.A. (2009) Mathematics Anxiety and Progressive Muscle Relaxation in the Affective Drop in Performance of Students. *Journal of Psycho-educational Assessment, 27(3),* 197-205

Badekale, A. J., (2003). Women and Engineering in Nigeria: Towards Improved Policy Initiatives and Increased Female Participation. African Technology Policy Studies (ATPS), *Working Paper Series* P.37.

Baloglu, M., & Kocak, R. (2003).A Multivariate Investigation of the Differences in Mathematics Anxiety. *Personal. Individual. Differences, 40 (7),* 1325-1335.

Bandura A. (1997). Self-Efficacy: Towards a Unifying Theory of Behavioural Change. Psychol. Rev. *84:*191-215.

Benjamin, M., Mckeaehie, W. Lin, Y., & Hollinger, D. (1991). Test anxiety: Deficits in Information Processing. *Journal of Educational Psychology,73,* 816-824.

Berger, V. (2005). Systematic Desensitization. Retrieved from www. Simply Psychology.org, on August 15, 2012 branches of Secondary School Mathematics *Journal of Education and Technology 1(1),* 161 -168.

Bishop, S.J. (2007). Neurocognitive Mechanisms of Anxiety: An Integrative Account. *Trends in Cognitive Sciences, 11,* 307-316.

Bishop, S.N. (2006). Implementation and Assessment of a Test Anxiety Reduction Program. Presented to 10th Graders and their subsequent Performance on the Montcas criterion referenced test. Doctoral Dissertation, University of Montana Missoula, M.T. branches of Secondary School Mathematics *Journal of Education and Technology, 1(1),* 161 - 168.

Bruntstein J. G., Maier, G.W. (2005). Implicit and Self-Attributed Motives to Achieve http://www.personality research.org/papers rabideau html, *6 (5)* 23-29.

Bufka, L., Barlow, F., & David H. (2009).“Anxiety”. Microsoft Encarta (DVD) Redmond, WA: Microsoft Corporation.345-356.

Busari, A. O., & Osiki, J. O. (2001). Test Anxiety Management for Students: A Cognitive Behavioural Programme. Department of Guidance and Counselling University of Ibadan, Ibadan. *3 (2)* 19-23.

Cassady, J., & Johnson , R.(2002). Cognitive test anxiety and academic performance. *Contemporary Educational Psychology, 27,* 270-295.

Cherry, K. (2012). Test anxiety symptoms. About.com. Retrieved 24 April 2012.

Cox, K. (2007). *Fraction and Decimals*. Georgia. Georgia: Department of Education and Skills. Retrieved from http://dera/loe.ac.uk/4873/1/ maths InquiryFinalReport.pdf.

Corey, G. (2009). The art of integrated counselling and language learning. *Journal of Educational Psychology, 3(5).* 34-45.

Dewey, J. (1896). *The reflex arc concept in psychology*: Psychological Review, *3,* 357-370.

Dickinson, D.J., & O’Connell, K. (2004) Effects of Qualitative Learning Reducing Anxiety of Students, using Systematic Desensitization. *Journal of behaviour and cognitive psychology, 33(2),* 249-254.

Dolcos, F., & McCarthy, G. (2006). Brain systems medicating cognitive interference by emotional distraction. *Journal of Neuroscience, 26*, 2072 – 2079.

Dotun. F. (2005) Mathematics game for teaching simple substitution of values into algebraic expressions. *Journal of Issues on Mathematics, 8(1),* 97-105.

Dubord, G. (2011). Systematic desensitization.*www.cfp.ca, 4 (2),* 78- 99.

Duffy, C. (2011). Systematic Desensitization: A treatment from the Learning Approach: *http://gsspsychology.*2009 *wordpress.com*

Egbochukwu, E.O. (2005): Immediate online access *Journal of Instructional Psychology,2 (1),* 12-21.

Egbochukwu, E.O., Obodo, B., & Obadan, N.O. (2008) Efficacy of rational-emotive behavior therapy on the Reduction of test anxiety among adolescents in secondary schools. *European Journal of Social Sciences, 1(3),* 6-12

Ellis, A. (2009) Rational Emotive Behaviour Therapy: It works for me – it can work for you. ISBN 1-59102-184-7

Else-Quest NM., Hyde JS., Linn MC (2010). Cross-National Patterns of Gender Difference in Mathematics: A Meta-Analysis. Psychology. Bull, *136(1):*103-127.

Ernest, P. (2003). The Nature of Mathematics Education and Anxiety Level in Teaching Philosophy of Mathematics. Newsletter 9. UK University of Exeter (retrieved August 2007)

Eyseck, M. W.(1982). Attention and Arousal: Cognition and performance. Berlin: Springer.

Ezeameyi, M. N. (2002). The Effects of Games on Mathematics Achievement, Interest and Retention of Junior Secondary School Students.Unpublished Ph.D Thesis. Department of Mathematics. University of Nigeria, Nsukka. *2 (3)*54-67.

Fajemidagba O. (1990) Secondary School Mathematics teachers' cognitive view of the relative difficulty and importance of mathematics learning items paper presented at Lagos *1(2),* 13-17

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

Flarbor, A., & Peters, V.F.A. (2000). Unmasking some Aversive Aspects of Schools Mathematics and Strategies for Averting them. An inaugural lecture, UNN

Freedman,E.(2003).Professor Freedman's Math Website. Retrieved from *http://www.mathpower.com*.

Fritscher, L.(2009).Systematic Desensitization: Medical Review *http:/www.phobias.about.com.*

Fumer, J. & Berman, B. (2003). Math Anxiety: Overcoming a Major Obstacleto the Improvement of Student Math Performance. Childhood Educ.*79 (3):*170-174.

Gale, C. & Davidson, O. (2007). Generalised Anxiety Disorder. MBJ. 579-81.

Garry, V. S. (2005). The Effect of Mathematics Anxiety on the course and carrier choice of high school Students' Academic Hardiness. Vocational-Technical Educ. *21 (3):* 11-19.

Henbree, R. (1990). The Nature, Effect and Relief of Mathematics Anxiety. J. Res. Math. Educ. *21(1)*:33-46.

Hopkins, T. M. (2004). Gender issues in Mathematics' achievement in Tennessee: Does rural school locale matter? A Ph.D. dissertation, University of Tennessee, Knox-Ville.

Hopko, D.R., Mahadevan, R., Bare R., & Hunt, M.K. (2003).*The abbreviated mathematics anxiety scale (AMAS): Construction, Validity & Reliability, Assessment,10*, 173-182

Hopko, D.R., McNeil, D.W., Lejuez, C.W., Ashcraft, M.H., Eifert, G.H., & Riel, J., (2003).The Effects of Anxious Responding on Mental Arithmetic and Lexical Decision Task Performance. *Journal of anxiety Disorders, 17(6),* 647-665.dol:10.1016/SO887-6185(02)00240-2.

Howley, C. (2002). Research about Mathematics achievement in rurual circumstance. Working paper, No. 4. Athens. Ohio University, Appalachian Collaborative Centre for the study of learning, assessment and instruction in Mathematics.

Ibe, P.O. (2008). Relationship between test-anxiety, Self-concept and Academic achievement of Secondary school students in chemistryunpublished. M.Ed. Thesis.

Jones, B. (2001). Modification of Dysfunctional Perception in Alleviating Mathematics Anxiety. Danville Community College. *Journal of science. 67(2)*

Ifeagwazi, M.C. (2008). Influence of Demographics Variables in Test Anxiety among Students. *International journal of educational research, 8*, 1-11.

Kenrick, D.T., Li., N.P., & Butner, J. (2003) Dynamical Evolutionary Psychology: *Individual Decision Rules and Emergent Social Norms. Psychological Review* 110:3-28

Leone, C., & Hall, I. (2003). Self-Monitoring, Marital Dis-satisfaction and Relationship dissolution: Individual differences in orientations to marriage and divorce, *self & identity*, 2, 189-202

Ma, X., & Xu, J. (2009). The Causal Ordering of Mathematics Anxiety and Mathematics Achievement: A Longitudinal Panel Analysis, J. Adolescent.

Macleod,S.A.(2008).SystematicDesensitization.Retrievedfromhttp://www.simply psychology.org/systematic-Desensitization.html mathematics, anxiety and performance. *Journal of Experimental Psychology General 130 (2)* 224-237.

Mahmood T., Khatoon S. (2011). Development and Validation of the Mathematics Anxiety Scale for Secondary School Students.Br. J. Arts Soc. Sci. *2(2).*

McDonald, A. (2001). The Prevalence and Effects of Test Anxiety in School Children. Education Psychology, *21(1),* 89 -101.

McLeod, D.B. (1993). Research on Effect in mathematics education: A reconceptualization. In D.A. Grouws (Ed.), *Handbook of research on mathematics teaching and learning.* (pp. 575-596). New York: MacMillian Publishing ltd.

Miller, H., & Bichsel, J. (2004).Anxiety, working memory. *Gender and math Performance. Personality and Individual Differences, 37(3),* 591-606, dol:10.10.1016/j.paid.2003.09.029.

Moses, A.O., & Daniel, 1.0 (2008).Meeting the Challenges of the New Technologies in Science Education in Southern Nigeria: The Peer Group/Gender Sensitive Approach. Educational Research Revised, *3(7),*242-245.

Moyela, B., (2005). Effects of Perseverance in the Face of Adversity of Secondary School Students in Mathematics. Vol. 12 Issue 2 Article 7.

Newman, B., & Eyck, P. T. (2005). Self–Management of initiations by Students diagnosed with autism. *The Analysis of Verbal Behaviour, 21*, 117-122.

Nwankwo C. A., Obi, J. S., & Obi, I. (2014). Effects of study skills technique in reducing test anxiety among secondary school adolescents in Anambra State. *General studies on education, science and Public issues in Africa, 4(1),* 51-59.

Nweke, I.O. (2002). The effect of Students involvement in test school mathematics in students' achievement and retention. See school mathematics M.Sc. (ed.). Thesis Faculty of Education ESUT, Enugu.

Nwokolo, C.N. (2006). Appraisal of the implementation of Guidance and Counseling Services at the post primary level. *Unizik Orient Journal of Education 2(1)* 235-242.

Nworgu, L.N. (2005). Effect of Gender Sensitization Package (GSP) on Students Achievement in Integrated Science JSTAN, 40 (1 & 2), 74 -79.

Nze, A. I. (2007).Sure Alpha in Mathematics (Model Questions and Answers 1988-2006). Nnewi. Mis-Fav.

Obanya, P. (2002) Revitalizing Education in Africa: Lagos Sterling, *2(1)* 23-45.

Obodo, G.C. (2014). Principles and Practices of Mathematics Education in Nigeria. Enugu: General Studies division. Enugu State University of Technology (ESUT). 2007-2013.

Okigbo, E.C., & Osuafor, A.M. (2008).Effect of Using Mathematics laboratory in Teaching Mathematics on the Achievement of Students. Educational Research and Review *3(8).*254-261.

Okoye, N.N. (2006). Some Basic Issues in Sensitivity training. Onitsha: Harris Publishers. Pp19-23.

Oliha, J.A., & Audu, V. E. I. (2012). Effects of Counselling Techniques in the Rehabilitation of Truant Adolescents with Emotional Mal-Adjustment Problems. Retrieved on 4th August, 2012, from www.ajol.

Pavlov. V.P. (1927).The Work of the Digestive Glands. London: Griffin.

Piane, G. (2003). Contingency Contracting and Systematic desensitization for Heroin Maintenance Programs. *Journal of Proactive drugs, 32(3),* 311-319.

Pickering S.J., & Gathercole, S.E. (2001).Working memory battery for children.University of Bristol.

Richards, A., French, C.C., Keogh, E., & Carter, C. (2000). Test anxiety, inferential reasoning and working memory load. Anxiety, Stress, & Coping, *13*, 87-109.

Richardson, F.C., & Suinn, R. M. (1972). The Mathematics Anxiety Rating Scale: Psychometric data. *Journal of counselling psychology, 19(6),* 551-554.

Rock, M. L. (2005).Use of strategic self-monitoring to enhance academic engagement, productivity, and accuracy of students with and without expectationalities. *Journal of Positive Behavior Interventions, 7(1),* 3-17.

Rothbaum, B.O. (2000). Systematic Desensitization in the Treatment of Fear, in Test Performance. Retrieved from www.tamut.edu, on 12th August, 2012.

Ryan, R., & Deci, E. (2000). Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development and Well-Being. American Psychologist, *55(1*), 68-78

Scott, M.S. (2012). Test anxiety: Stress Management. Retrieved from stress.about.com. on 24th April, 2012.

Sharma, S. (2002).Anxiety in Students. Psychological Studies, *47*, 49-53.

Smith, A. (2004). Making Mathematics Count: The Report of Professor Adrian Smith's Inquiry into Post -14 mathematics education. (report No. 4873). London:

Spicer, J. (2004).Resources to combat math anxiety. Eisenhower National Clearing house Focus *12(12)*. Retrieved July 12, 2004: http://www,enc.org/features/focus/archive/mathansiety/document/shtm?input=FOC-003455-index

Spielberger, C. (2005). The Nature, Assessment and Reduction of Test Anxiety. In Academic Benefits From Test-Anxiety Reduction Programs. Symposium at the American psychological Association Convention, Washington, D.C.

Spielberger, C.D (1992). 'Anxiety as an Emotional State' in C.D. Spielberger (ed.) Anxiety Current trends in theory and research. New York: Academic Press.

Stober, J., & Pekrun, R. (2004).Advances in test anxiety research.Anxiety, Stress and Coping, *17(3)*, 205 -211.

Strumpf, J.A., & Fodor, I. (2003). Test anxiety: Theory, assessment and treatment. Washington, D.C.: Taylor & Francis in www. Encyclopedia.com student grades using systematic desensitization. *Journal of behaviour and cognitive psychology,33(2)* 249-254.

Thissen, D., &Wainer, H. (2001). Test Scoring. Mahwah, NJ: Erlbaum.

Thorndike, E (1932). The Fundamentals of learning. *Ams Press Inc*. ISBN 0-404-06429-9.

Tolin, D. F. (2012). Face your fears: A proven plan to beat anxiety; panic, phobias and obsessions. Hoboken, NJ: Wiley.

Ukeje, B.O. (1986). Education for Social reconstruction, London. Macmillian.

Umoru-Onuka (2004).Accountability in Education.Program, for Improving Students' Performance. *A Book of Honour*. Pp 125

UNESCO (2003). Gender and Education for all: The Leap for Equality. Global Monitoring Report 2003/2004. http:/www.unesco/oc. unesco.org/ education/eta-report/2003-pdf/chapter3.pdf.

United Nations (2000). U. N. Millennium Declaration 55/2 Resolution Adapted by the General Assembly, September18, 2000. http://www.un.org/ milleniumgoals.

WAEC monthly seminar, Feb. 23.Yaba Lagos. *2(3)* 23-27. Federal Republic of Nigeria (2004) *National Policy on Education.* Lagos. NERDC Press. Pp 67.

West African Examination Council (2002), *Chief Examiner's Report.* Lagos: WAEC, Statistics Division.

Wiederhold, B. K., & Wiederhold, M.D. (2005).Final comments and future directions. In B.K.Wiederhold & M.D. Wiederhold (eds.), Virtual reality therapy for anxiety disorders: Advances in evaluation and treatment (pp.191-196). Washington, D.C: American Psychological Association.

Weiner, I.B. (ed.), (2003). *Handbook of psychology*. Volume 7. Educational Psychology, John Willey & Son Inc.

Wolpe, J. (1982). The Practice of Behavior Therapy. 3rd edition, 1982.Pergamon Press Retrieved on 15th April, 2012 http://www.steven /ewis: info

Yezici, E., & Ertekin, E. (2010). Gender Difference of Elementary Prospective Teachers in Mathematical Beliefs and Mathematics Teaching Anxiety. Int. J. Hum. Soc. Sci. *5(9).*

Zeidner, M. (2004). Test Anxiety. In Spielberger (Ed.). Encyclopaedia of Applied Psychology (Vol. 3, pp. 545-556) San Diego: Academic Press.

Zettle, R. D. (2004). Acceptance and Commitment Therapy VS Systematic Desensitization in treatment of Mathematics Anxiety. The Psychological record, *53,* 197-215.

Appendix A

Treatment Of Primary School Pupils with Mathematics Anxiety (Treatment Program, Systematic Desensitization)

Approach: Systematic Desensitization Therapy.

Theories employed: Systematic Desensitization by Joseph Wolpe and Classical Conditioning by Ivan Pavlov.

Techniques: Behaviour modification techniques.

Skills: Identification and expression of subjective degree of anxiety. Prioritization of steps, towards the feared objects from least, to most anxiety inducing and acquisition and pairing of relaxation skills.

Mode: Individual counselling/group counselling.

Recipient: Primary school pupils with mathematics anxiety.

Duration: 8weeks each lasted for 40 minutes.

Purpose: To reduce or eliminate anxiety disorders or some phobic reactions so that anxiety will no longer be elicited.

Week 1 – Introduction

Week 2 – Explanation of mathematics anxiety

Week 3 – Relaxation training and interaction of scene instruction

Week 4 – Understanding why all major body parts are relaxed

Week 5 – Hierarchy of item as they create anxiety

Week 6 – Focusing on review and success when doing maths

Week 7 – Creating success from anxiety

Week 8 – Climbing the test anxiety ladder and the use of index cards

Opening of session instruction.

Week 1

Theme: Introduction

Duration: 40minutes

Objective: Introduction and familiarization of all group members to the school authority and to the pupils. Also, informing the school authority of the duration of the exercise, the venue and what systematic desensitization as a technique entails.

Activities:-Step1. Good afternoon pupils! I am from the Nnamdi Azikiwe University, Awka. I am here to help you improve on your mathematics performance. What we are going to do here specifically is to help you learn to relax well enough so that in the future, you will practice it yourself. This will enable you gain control over anxiety or tension. This relaxation training will teach you how to recognize tension and distinguish it from relaxation and from muscle strain. By learning how to recognize tension, you can eliminate them easily.

Step 2. The researcher will warmly welcome the pupils to get them relaxed as they introduce themselves to the researcher.

Step 3. Evaluation. The counsellor tries to recall the names of some of the pupils.

Step 4. The counsellor will conclude the meeting by reminding the pupils of the interesting purpose of the meeting and why punctuality would help them achieve their goals. And at this juncture the pupils will be told that the meeting will last for eight weeks of one session per week and that they must be present at all the meetings. Each session will last for forty minutes (40 mins) all through the counselling period.

End of Session Instruction.

Pupils were told that they had done well and that they could relax properly. Also, pupils were told that they had learnt to associate relaxation and not tenseness with their new friend the counselor if they had actually performed satisfactorily.

Week 2

Theme: Explanation of mathematics anxiety

Objective: At the end of the lesson, the pupils were made to become familiar with the meaning of mathematics anxiety.

Duration: 40minutes

Activity: The counsellor met a very noisy class and stood at the door for the pupils to see her. That calmed them down as they all stood to greet the counsellor.

Pleasantries were exchanged for the pupils to relax and accept the counsellor. The researcher took a roll-call of all pupils present in the class.

Distribution of handouts: The researcher distributed handouts to all the pupils in the class. Pupils were reminded that tests were normally stressful only when imagined as difficult. Even when the skills they adopted were mainly to improve performance, sometimes application of the skills could prove abortive. However, they were asked to relax and made to feel free and express all they felt when in that anxious situation. The researcher narrated some scenarios depicting mathematics anxiety situations and the pupils were expected to respond by sharing their own fears by giving vivid examples of situations where they had felt anxious during mathematics tests.

Summary: The session was concluded with a rehearsal and the researcher responded to the questions on mathematics anxiety from the pupils.

Evaluation: At the end of the session the counsellor evaluated the pupils with the following questions:

a. Explain what made you anxious in a mathematics class.

b. With the handouts, pupils were asked if they thought they had expressed their fears for mathematics correctly, if so well done.

The researcher leaves the class after reassuring the pupils of better days ahead in terms of understanding the rudimentary basics in doing mathematics under a relaxed atmosphere.

Week 3

Theme: Relaxation Training and Imagination of Scenes Instructions

Duration: 40mins

Objective: At the end of the session the pupils were expected be to

a. Relax all body parts as they imagined each scene.

b. Practice some relaxation techniques.

Procedure /Activities

Step 1: The counsellor in a relaxed mood came into the class and pleasantries were exchanged as some of the pupils names were called with ease by the counsellor.

Step 2: Relaxation training mastered

Step 3. After the relaxation training had been mastered, the pupils were made to imagine a series of twelve scenes (which previously made them anxious about mathematics). This was done as vividly as possible in a relaxed state.

Step 4. The researcher asked the pupils if they could imagine the scenes while they assumed a relaxed state, then relaxation and not anxiety/tension would become associated with them.

Procedure/Activities

1. Asked to sit down comfortably on their seats.
2. Made sure pupils were comfortable as possible. Eg, If pupil's shoe was source of discomfort, the pupil was asked to remove them.
3. Made the pupils' mind as blank as possible. Sat comfortably.
4. Focused thinking on the particular muscular system mentioned for relaxation exercise.
5. Muscular relaxation training was given for two minutes (2 mins). Relaxation cues were given thus: Relax, feel calm and warm.

6. After a completion of a set of muscular exercises, pupils were asked to take a deep breathe by counting on odd numbers and exhale by counting the even numbers, until the count of twenty (for 1 min) was reached.
7. Imagination of scenes: Each item content was repeated for only ten (10) and thirty (30) seconds interval
8. In between presentation of the same scene, only twenty (20) seconds of continued relaxation was allowed. During which time the researcher counted up to six, while you'll breathe in on the odd numbers and out on the even numbers.
9. Raise your left index finger if you feel yourself becoming less relaxed or becoming afraid.
10. Once a member of the group signals anxiety, all the pupils were asked to stop imagining the scene
11. Pupils were then taken through all the relaxation training again.
12. Pupils raised your right index finger when you have returned to the relaxed state again.

Summary: The counsellor summarizes the days' lesson by reminding the pupils of why relaxation is necessary to help them understand mathematics when it is been taught in class.

Evaluation: At the end of the session the counselor will ask the pupils if they gained from the relaxation training.

Week 4

Theme: Understanding why all major body parts should be relaxed in an anxiety situation.

Duration: 40mins

Objective: At the end of this session, the pupils should be able to

a. Know why all body muscles should be relaxed before any mathematics problem is attempted.

b. Get all the muscles of all the body parts which include the head, hand, ear etc relaxed in all the pupils.

Procedure/Activities:

Step1: The counsellor starts by exchanging pleasantries with the pupils to get them smiling and relaxed.

Step b: A brief revision of last sessions lesson is discussed so that there was a follow up into the new lesson.

Step3: All pupils in class will be asked to stand up and breathe in gently then asked to breathe out in a relaxed mood.

Chalk board activities

Rationale for this therapeutic technique will be given thus:

That neurotic behaviour is learnt and can therefore be unlearnt through relaxation of body muscles. Therefore, there is a definite relationship between the extent of muscle relaxation and the production of emotional changes. Muscles are tensed when anxious but to inhibit anxiety, muscles must be relaxed.

Therefore, if you could master well the relaxation techniques, then you could expect reduction in mathematics anxiety and subsequently improve performance in mathematics. This is based on the fact that all behaviors including mathematics anxiety are learnt. This program will teach you how to cope with it.

Relaxation training will be given for the next ten (10) minutes.

The pupils will be trained on muscular relaxation for thirty minutes (30 mins) following these steps (each muscular relaxation will be presented for two minutes (2 mins) and after a

complete set of muscular relaxation training, the researcher will make these statements, "pupils, you are now relaxed, feeling calm and warm"

1. Tense the muscles of your forehead.

   Relax the muscles of your forehead.

2. Tense the muscles of your jaw.

   Relax the muscles of your jaw.

3. Tense the muscles of your neck.

   Relax the muscles of your neck.

4. Tense the muscles of your shoulder.

   Relax the muscles of your shoulder.

5. Tense the muscles of your thorax.

   Relax the muscles of your thorax.

6. Tense the muscles of your back.

   Relax the muscles of your back.

7. Tense the muscles of your abdomen.

   Relax the muscles of your abdomen.

8. Tense the muscles of your lower limbs.

   Relax the muscles of your lower limbs.

Pupils will be made to tell the counsellor how calm they are as a result of these relaxation trainings.

Week 5

Theme: The hierarchy of items as they cause anxiety

Objective At the end of the session, the participants will be acquainted with some mathematics test hierarchy of items chosen from the common hierarchy, progressing from the least anxiety provoking to the most anxiety provoking.

Duration: 40minutes

Activities: Introduce handouts, the pupils will be asked to imagine being exposed to situations that associated with mathematics test taking. Thirteen items will be listed

These will be listed thus:

1. Now imagine yourself at a party in which there is plenty of delicious food such as rice, meat, fried chicken, meat-pie and drinks to eat and drink.
2. Imagine that in your class, there is a sumptuous party going on and you are really having a nice time.
3. Now note the number of pupils in your class and try to figure out in your imagination the quantity of rice, meat fried chicken, meat-pie and drinks that will be sufficient for your class for everybody to have a really nice time.
4. Now imagine what the total cost of rice for the entire class will be if each pupil will eat two cups of rice and a cup costs one hundred and fifty naira(#150.00)
5. Now imagine what the total cost of meat will be if each pupil eats two pieces of meat and one piece of fried chicken. Each piece of meat costs two hundred naira (#200.00) and each piece of chicken costs two hundred and fifty naira (#250.00).
6. Next, imagine the total cost for the party, that is, for rice, meat, meat-pie, fried chicken and drinks. If each bottle of drink costs one hundred and twenty naira (#120.00) and each pupil is expected to drink two bottles of drinks.
7. What will it cost if boys are supposed to eat twice as much as girls in this class? Try to imagine the equation you will use to represent this situation.
8. What is the ratio for the situation stated in the previous scenes?

9. Now imagine that you are given some meat-pies for this class party, each boy is allowed to take three (3) pieces of meat-pies while girls take two pieces each. The class population is forty (40) and the number of boys is equal to girls. What equation will you substitute to solve this problem?
10. Now imagine in a step by step manner how you will use the equation you had given in the previous scene to find out the total number of meat-pie given to the class.
11. Now imagine the total number of meat-pie given to the class if each meat-pie cost one hundred naira (#100.00).
12. Imagine the equation you will substitute to solve this problem.
13. Now imagine the total cost of food and drinks that will be needed for this party.

Summary: The counsellor will summarize the lesson and highlight the salient points of the lesson.

Evaluation: At the end of the lesson, the counselor will ask the pupils the following questions

a. Explain how you feel at the point you were introduced to figures.

b. Express what came into your mind when you had to attempt the multiplication aspects in one of the items given.

Chalk board summary

Systematic desensitization

Systematic desensitization could be defined as a behaviour modification technique used to reduce or eliminate anxiety disorders. In our hierarchy the least provoking is mentioned such

as when mathematics is written on the board, until we get to the most anxiety provoking situation.

Children are made to copy the notes given on systematic desensitization and the session will come to a close.

Week 6

Theme : Focusing on review and success Factors when doing mathematics

Duration: 40minutes

Objectives: At the end of the session, pupil will be expected to have some level of self-belief in doing mathematics.

a. Identify behavioural signs of a pupil with mathematics anxiety.
b. What are the aspects of mathematics that make you anxious? These questions will be discussed for ten minutes (10 mins).

Procedures/Activities

We will now do our muscular relaxation training exercise following the procedures stated in week 2 (5mins).

When the pupils are noticed to be relaxed and calm, they will be made to imagine the following thirteen scenes of the last week, as vividly as possible (5mins). Pupils will be made to ask questions on what they have done so far. The last thirty minutes will be used by the researcher to teach the pupils graded mathematics. Pupils will be given a lot of mathematics exercises to do in class. The therapist will ask the following questions or make the following statements.

1. State the aspects of mathematics that elicit anxiety in you.
2. How are you now able to cope with such anxiety as they arise?

What steps do you take to reduce anxiety? Now you are going to practice the muscular relaxation training (15 mins).

Now that you are fully relaxed, close your eyes breathe in now and hold it for ten seconds and gradually release it. Begin to imagine these scenes as vividly as possible. Now that you are well relaxed, I am going to teach you mathematics.

3. **Summary** For the last thirty minutes, I am going to teach you graded mathematics and will give you some mathematical exercises to practice with.

Week 7

Theme: Creating Success from Anxiety

Duration: 40minutes.

Objective: At the end of the session, the pupils should be able to handle their mathematics anxiety situation.

Stating how some prominent people in society turned their anxious situation into success.

Procedure/Activities

The counselor will introduce handouts on how to turn mathematics anxiety into mathematics success.

a. Review the list of possible methods of overcoming anxiety in a hierarchical form
b. Have the pupils go back to the mathematics test success ladder and for each step on the hierarchy, the pupils will be made to tell the counselor how he or she tends to overcome their level of anxiety and turn it into a success story.
c. Checking on the pupils how many items they got correctly and encouraging them.
d. Encouraging the pupils to come up with their own unique plans on how to reduce mathematics anxiety and enjoy problem solving at their level.
e. Finally the researcher will allow the pupils to share their anxiety provoking thoughts in a group and how to embrace mathematics through relaxation and imagination.

Response and class comes to an end.

Week 8

Theme: Changing the test anxiety ladder and the use of index cards.

Objective: At the end of the session, pupils will be able to change most of their initial negative reactions towards the mathematics test anxiety ladder.

Duration: 40minutes.

Procedure/Activities: the counselor will introduce handouts already given in the previous lessons to the pupils.

a. The pupils will be made to complete the mathematics anxiety ladder created. They will be made to work on their own hierarchy and asked to create at least 10 scenarios that will include only stressors they experience in doing mathematics.
b. The pupils will be made to practice the relaxation and breathing therapy explained earlier as they handle each level of the hierarchy.
c. The researcher will form a set of index cards with an abbreviated set of instructions for each step on the desensitization procedure. The pupils will be instructed to use one step per card. The following suggestions will be made as stated below:

Cards	Abbreviated instructions
1	Relax
2	Read the anxiety instructions
3	Imagine the situation for a tolerable time
4	Stop and determine your anxiety level the re-establish relaxation.
5	Re-read the anxiety situation. Then, imagine the situation for a tolerable time.
6	Stop then determine your anxiety level. If anxiety is witnessed, then return to card No.2 However, if no anxiety then you proceed to card 7
7	Next item, return to card No.1

Review and Questions.

The researcher will then have a run-down of the over-all treatment package administered to the pupils.

Review so far:

Researcher: Let us go over the mathematical exercises. What difficulties do you encounter while practicing the exercises? How have you been able to cope with anxiety in mathematics lessons when they occur?

In the eighth week which is the final week, the adopted instrument for this study, Abbreviated Mathematics Anxiety Scale (AMAS) will be administered again to get the post treatment measures by the researcher.

Week 1

Opening session Instruction

Approach: Self–management therapy.

Theories Employed: Self efficacy and social cognitive theory by Bandura.

Skills: Identification and expression of social support to reduce mathematics anxiety. Focus on coping strategies by providing cues on self – reinforcement, self – analysis and self-monitoring.

Mode: Individual counselling/group counselling.

Recipient: Primary School pupils with mathematics anxiety.

Duration: 8 weeks.

Purpose: To reduce or eliminate anxiety disorder or some phobic reactions so that anxiety will no longer be elicited.

Theme: Introduction and meaning of anxiety

Duration: 40 minutes.

Objective: At the end of the session all participants are expected to understand the meaning of anxiety as well as mathematics anxiety.

Activities: Step 1: Good afternoon pupils! I am from the Nnamdi Azikiwe University. I am here to help you improve on your mathematics performance by reducing the anxiety you witness when it is time for mathematics lesson. What we are going to do is to help you understand the meaning of anxiety and how it affects mathematics learning, because the anxiety you witness when you see numbers on the board or when solving mathematics makes it difficult for you to do well in mathematics texts. The training will teach you how to recognize tension and how it can be self-managed through and behaviours. By learning how to recognized tension, it can be easily eliminated.

Step 2: The researcher warmly welcomes the pupils and gets them to confidently say their names to loud and clear hearing as they introduce themselves.

Step 3: The researcher tries to recall some names of the pupils which get the pupils excited.

Step 4: The researcher meets the pupils in groups and talks about the behaviours that are causing concern in the classroom (mathematics anxiety). Explanation of the rationale for the behaviour is given and how it works is explained to the pupils in the simplest form considering their age bracket.

Thereafter the researcher models what the appropriate behaviour should be. The pupils were asked to participate in the program and were encouraged, to express themselves freely mathematics anxiety was explained as follows:

- The fear of being asked to recite the time table in assembly.
- The thought of failing mathematics and the consequences thereafter by the class teacher.
- Assignment on mathematics not understood.

The style of study, psychological factors, needed information and issues relating to the individuals lifestyle. For this program, emphasis was placed on only the style of study as well as the psychological factors. She explained that the ineffective study style includes: Memorizing the mathematics steps without understanding the basic concepts, not practicing to solve mathematics while trying to understand the required formulae and refusing to do mathematics assignments, because of fear of failure.

Procedure / Activities: Sit down comfortably on your sits and tell yourself I can do maths and I will have no fear to attempt. Pupils are given an exercise book each to express them positively. Thereafter, a mathematics problem stating within multiplication of numbers from the primary 5 curriculum is written on the board e.g. 68754 X 275 were written and timed for the pupils to solve in a time space of 4 minutes.

Pupils were asked to follow the multiplication rules and be confident that they are on the right part to actualize their mathematics prowess.

Summary: The counsellor summarizes the day's lesson and tells the pupils that they have performed well by attempting confidently with less anxiety.

Evaluation: At the end of the session, the counsellor will ask the pupils if they gained from the lesson.

Week 2:

Topic: Self-confidence

Objective: At the end of the session, the participants are expected to understand the role self-confidence plays in mathematics learning.

Duration: 40 minutes.

Step 1: The researcher gets into the class confidently and with friendly facial expression the pupils were confident to listen to her.

Step 2: Roll calls of the pupils in class was taken.

Procedure: The researcher immediately asked pupils to stand up and say some nice words to themselves aloud e.g." I am a confident child" I can achieve success in maths as they beat their chest. After 2 minutes free actions the pupils are asked to sit down quietly.

The meaning of the word confidence was explained to the pupils as self– belief and how it would help them begin to say positive words to themselves. This will help them have a free and open mind to achieve success not only in mathematics but in other spheres of life.

The researcher explains the signs of low self-confidence as follows:

- Regularly thinking negative thoughts
- Anxiety
- Speaking quietly or mumbling
- Avoiding doing certain things because of the fear of the ability to cope.

The researcher explains further that if pupils boost their self –confidence, particularly when faced with mathematics problems they would understand better. Particularly if negative thoughts are stopped each time they come up. The pupils were encouraged never to give up

but to always make an attempt and ask questions when in a difficult mathematics question, when help is given learning becomes easier.

Week 3

Theme: Self- Analysis

Duration: 40 minutes.

Objective: At the end of the session pupils should be able to understand their strength and weakness.

Procedure/Activities:

Step I: The counsellor exchanges pleasantries with the pupils in class and take a roll call of all those present.

Step II: A brief revision was given from last session's lesson before asking the pupils to analyse the aspect of mathematics that cause problems for them, while in the class or when they are asked to do assignments.

Step III: All pupils are asked to feel free to share their views with other class mates.

Procedure/ Activities: The counsellor introduced plain sheets of papers and asked pupils to state their strengths in mathematics and their weaknesses. All plain sheets were collected and about 4 (four) randomly selected ones were treated in the class. They all expressed doubt in their ability to attempt simultaneous equations because of the complications in the settings. This creates instant anxiety, but they all expressed less anxiety when additions of simple numbers were given.

The researcher explained to the pupils that weakness in mathematics is as a result of refusing to understand the rules guiding the solving of the problem. This could be achieved when the pupils analyse self and reiterate their steps on their own accord so as to find out when they lost the conceptual stage of mathematics at the given level.

Summary: The counsellor summarizes the day's lesson and tells them to attempt the maths problems that cause anxiety for her to see in the next lesson.

Evaluation: At the end of the session, the pupils were asked if they gained from the lesson.

Week 4

Theme: Recording Behaviour

Objective: At the end of the session pupils should be able to record their behaviours.

Duration: 40 minutes.

Activity: The appropriate monitoring form is provided by the researcher who decides on the type of cure system to be used. The time intervals for recording behaviour were based on the severity, intensity and frequency of the behaviour. Cueing systems used were an audio-beep (using a phone), a visual cue or a physical or verbal prompt to remind the pupils when to record.

Using a direct instruction method, the researcher taught the self- monitoring process that will be described here below.

I. Regular, evenly spaced "behaviour checks" during which pupils focus on their behaviour.
II. An individual tracking sheet for recording behaviour observations.
III. A plan for withdrawal from the system.

Whole class self monitoring also included a short discussion period in which students had an opportunity to focus on and discuss in objective terms the behaviour of themselves and their classmates. Such behaviours as negative thoughts, persistent thoughts, irrational thoughts, and such feelings which could easily be in form of fearfulness.

The researcher explains that irrational thoughts are from a make –belief that

- When a pupil gets a wrong mark in mathematics problem that means failure.

- Repeating and strengthening the irrational thought before the mathematics assignment is given or after.
- Linking one`s self-worth to the test outcome.

Also, are some irrational ideas like:

- Self -Judgment: “I know I will fail the mathematics assignment”. It’s no use trying.
- Comparison: Others are better than I am and I am a share of myself.

Anticipation: “If I get nervous at all I just know I will go blank and totally fail the mathematics test or exams”.

Acceptance by others: My parents and friends will approve of me if only I perform well in my mathematics tests.

Faculty Logic: I will be a total failure if I fail this mathematics test.

Rigid insistence: If I have to be happy then I must pass this mathematics examination.

Perfectionism: If I do not get all my mathematics questions correct then I am a worthless person.

Summary: The pupils are strongly advised to concentrate on honest self- reporting and not to be overly judgmental of behaviours both positive and negative.

Evaluation: At the end of the session, the pupils were asked if they benefited from the lesson.

Week 5

Theme: Self-reinforcing technique.

Objective: At the end of the session, the participants were expected to have learnt the self-reinforcing techniques which they could apply in reducing mathematics anxiety.

Duration: 40 minutes.

Activities:

Step 1: The counsellor happily walks into the class and exchange pleasantries with the pupils.

Step 2: Pupils were made to sit quietly and answer to their names from the register.

Step 3: The last week's technique is reviewed and pupils are given the opportunity to discuss how they have been able to regularly check the way they behaved when mathematics assignments are given.

Step 4: The pupils were encouraged by the research to list possible re-enforcers that they could use to reduce the anxiety they witness during mathematics lessons.

The researcher explained to the pupils that when pupils are taught on how they could reduce mathematics anxiety by reassuring themselves the positive reinforcing words like "mathematics is easy and so I can understand it" It will help them accept the challenge that comes with mathematics problem solving.

Discussion: The researcher explains to the pupils that reinforcement occurs if there is an observable strengthening in behaviour and when a particular behaviour is rewarding. In mathematics for example, when the pupil`s performance is remarkable, he is praised and could even get some tangible gifts like an exercise book. Such a pupil could be asked to come in front of the assembly ground and applauded by the whole school.

Activity: The researcher gives the pupils 2 minutes to interact with another classmate of their choice with words of encouragement such as" I will get all my sums in mathematics correct if I work hard in it". Mathematics is my best subject. Some mathematics problems are written on the chalk board and pupils are encouraged to attempt. For any positive step made the pupil was applauded by the researcher and the classmates.

Week 6

Theme: Self- Evaluation and review of practiced technique.

Objectives: At the end of the session, the participants were able to learn more of the anxiety reduction techniques which they could apply in reducing mathematics anxiety.

Duration: 40 minutes.

Activity: The pupils were exposed to anxiety reduction techniques in the previous session. The techniques were rehearsed and the participants learnt how to focus attention. The researcher continued by telling the pupils to always think positive and to focus their attention on external exam tasks facing them rather than the inner thoughts which is worrisome in the following manner.

Time: 40 minutes.

Activity: All previous session were reviewed with the aim and objective of understanding the extent of success the program had been to the pupils.

Program concluded with a prayer session by all the pupils.

Week 7

Self-Study.

Objective: At the end of the session, pupils would have mastered new techniques of studying mathematics on their own.

Duration: 40 minutes.

Procedure:

Step 1: The researcher as usual exchanged pleasantries with the pupils.

Step 2: The review of the last session`s technique was highlighted.

Activities: The pupils were exposed to different study- styles for mathematics. The researcher explained to the pupils that since mathematics is a peculiar subject which deals mainly with figures, it had steps but if pupils were to understanding the subject the steps were enumerated.

1. A pupil should have an exercise book with a pencil or a pen when studying maths.

2. Each example learnt must be written and practiced immediately to determine if pupils have understood the taught concept.
3. Mathematics as an everyday subject must be practiced regularly so that the pupils master the basic rules guiding the topic.

The researcher explained to the pupils that mathematics anxiety is as a result of pupils' style of studying the subject. Pupils should not only listen to the teacher as in a story form but must help themselves by solving whatever is explained so that the basic concept needed is understood and confidence in the subject restored.

Class Activity: The researcher wrote some mathematics problems on the board and watched the children`s approach as she explained.

Week 8

General revision of all activities, from week one (1) to week seven (7)

CONTROL GROUP

Week 1

Opening of session instruction

Duration: 40minutes.

Approach: No treatment (conventional group)

Introduction and familiarization: Teacher introduces herself to the pupils and gets the pupils introduce themselves to her.

Topic: Multiplication of figures in thousands.

Step 1:- Teacher introduces the topic to the pupils and asks them to identify four figures as a thousand For example: 3,864 would mean three thousand, eight hundred and sixty four.

Step II: Pupils are asked to recite the time tables from 3 to 12.

Step III: Pupils are told that four digits make up a thousand e.g 3,864 = 4 digit numbers. This will be placed in this format Th H T U. and multiplied by two digit numbers 27 in this format 3 8 6 4

x 2 7

Step IV: Get the pupils to solve four digit numbers multiplied by two digit numbers.

Step V: Teacher explains the topic to the pupils and asks them to answer the question and submit.

Step VI: Teacher marks and corrections are done generally on the board and those who performed poorly are asked to copy the correct steps on the board, without therapeutic procedures to relax them understand the topic.

Step VII: Teacher concludes the topic and tells the pupils and informs them of the nextlesson in a weeks' time

Week 2

Objective: Division of three digit numbers by two digit numbers without a remainder. Exampl: 6 7 5 ÷ 15

Step I: Teacher introduces the topic on the board after exchanging pleasantries with the pupils, she explains to the pupil that numbers to be divided come in fraction forms and must have a numerator and a denominator and that a numerator is the number that you'll divide with the denominator which is the number down.

Step III: Pupils are asked to identify the numerator and the denominator of numbers and correctly place them in the appropriate position within the drawn box as identified below.

Step VI: Teacher gives an example of the topic on the board and all the children in the class are made to solve the examples as instructed. This is done without any form of therapeutic treatment.

Step V: Pupils are asked to solve five related question as assigned by their mathematics teachers in their mathematics note books.

Step VI: The teacher collects the exercise books for marking.

Step VII: Corrections are solved on the board and the lesson comes to an end.

Step VIII: Teacher tells the pupils a new related topic will be introduced in the coming week and leaves the class.

Week 3

Theme: Division of decimal numbers

Objective: At the end of the lesson, pupils are expected to know how to divide numbers presented in division forms.

Step I: Teacher introduces the topic of division on the board

Step II: Pupils are made to understand that decimal fractions are different from whole number fractions.

Step III: Teacher gives examples on the board and ask questions relating to Decimal placed numbers for example 163.42 ÷ 0.4

Step IV: Teacher tells the pupils that, Decimal numbers are converted to whole numbers when the decimal numbers are multiplied by 10's. E.g 63.42 ÷ 0.4 = 163.42 x 100 / 0.4 x 100.

Step V: Pupils are asked to proceed with the division in the same manner as last week.

Step VI: Teacher ask pupils to open to the related exercise from their text book and five questions are given.

Step VII: Pupils submit the mathematics exercise to the teacher.

Step VIII: Teacher ends the period and promised to be back with a new topic in the scheme without any counselling therapy applied.

Week 4

Objective: Pupils should be able to convert percent to common fractions and vice – versa.

Step I: Teacher explains to the pupils that percentage is a special type of fraction which can therefore be expressed as either a common fraction or a decimal fraction and that the symbol % is used in place of the word percent.

Step II: Pupils are informed that percentages must come as fractions with 100 as denominator

Step III: Pupils are made to express a percent as a decimal fraction by moving the decimal place, two places to the left. E.g $\frac{8}{100} = 0.08$

Step IV: Teacher ask pupils to do some assignments in their mathematics note book and submit

Conclusion: Pupils are informed that lessons will continue in a weeks' time, and lesson ends without pupils benefitting from and technique that could resolve their anxiety in mathematics

Week 5

Objective: Pupils should be able to identify positive and negative integer numbers on the number line.

Step I: Teacher introduces the topic on the board (Integer on the number line as positive and negative whole numbers).

Step II: A horizontal line is drawn and divided into equal parts.

Step III: Teacher marks the starting middle point on the drawn horizontal line as zero = o

Step IV: The teacher labels both sides of the line with positive and negative numbers as shown in the figure below.

Step V: Pupils are told that the starting point is zero and points to the right are positive and to the left are negative. For example: – 5 + 3 means counting from – 5 to 3points to the right.

Step VI: Teacher gives class work assignment relating to the topic for the pupils to answer

Step VII: The assignments are collected after 40minutes of lessons with no technique to reduce anxiety for the pupils who are assumed to be mathematics anxious.

Step VIII: End of lesson

Week 6

Topic: Fundamentals of Geometry

Objective: Pupils should be able to identify and classify simple solids, faces and edges in mathematics.

Step I: Teacher introduces the topic on the board and the pupils listen. Pupils are asked to look around them and write down the list of 10 items they can see.

Step II: pupils are orally asked to identify the sizes of the objects found around them, the lengths, distance from the pupils and their shapes.

Step III: Teacher explain to the pupils that all the objects that they have identified have common properties have an inside and an outside.

Step IV: Pupils are made to know by their class teacher that these objects are called solids or three – dimensional objects. Sometimes they are called 3 – D objects

Step V: End of lesson

Week 7

Objective: The pupils should be able to: Identify surfaces, faces, edges and vertices of solids.

Step I: Teacher introduces the last related topic and shows a cube of sugar to the pupils

Step II: Pupils are asked to draw the six sided objects (i.e cube of sugar) in their books

Step III: Teacher explains to the pupils that the surface of a cube consists of 6 identical faces, meaning all the faces have the same shape and the same size.

Step IV: Pupils are taught that the edge is that part where two faces meet. An edge may be straight or curved.

Step V: Pupils are told that the sharp edge in called the vertex.

Step VI: The teacher tells the pupils that (1) a cube has 12 sides and 8 vertices.

1. A sphere has no edge and no vertex
2. A cone has only one vertex and only one edge.

Step VII: Conclusion

The teacher gives assignments to the pupils and leaves the class, with no technique to reduce the mathematics anxiety the pupils were faced with each time a mathematics lesson was introduced on the board.

Subjects in this group received the pre and post treatment assessments as the treatment groups. They were informed immediately after the pre-treatment that the researcher will come back after a week when scoring would have been concluded. In the eighth week, the post-treatment test was administered.

POST-TREATMENT ASSESSMENT

A week after the treatment, all subjects were re-assessed in the same respect and by same instrument as done during pre-treatment assessments.

Finally the pupils were appreciative with words of thanks for the researcher and the research assistants.

Appendix B

Attachment Letter

Department Of Guidance and Counselling,

Faculty of Education,

Nnamdi Azikiwe University, Awka

10th June, 2015.

Dear Respondent,

The researcher is a post-graduate student of the above named university. She will be conducting a research on the 'Relative effectiveness of Systematic desensitization and Self-management techniques in reducing mathematics anxiety amongst primary five pupils in Delta State'. All information required from you is purely for research purpose. You are kindly requested to respond as honestly as possible to all the items in the questionnaire. The confidentiality of the information provided by you is strictly ensured and your name is not required.

Thank you for your cooperation.

Ogugua Glory Uru

The Researcher.

Appendix C

Letter to the Schools

Department of Guidance and Counselling,
Faculty of Education,
Nnamdi Azikiwe University, Awka
10th June, 2015.

The Principal, Dell
International School,
Asaba.

Dear Sir/Madam,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH STUDY IN YOUR SCHOOL

This letter serves as an application to conduct a research study in your school. 1 am a Postgraduate student of the above named institution. The research topic is the "Effect of Systematic Desensitisation and Self-management Techniques on Mathematics Anxiety among Primary School Pupils".

The research approach will be Experimental in nature since the aim is to investigate the effects of two techniques (Systematic desensitisation and Self-management). This study will be beneficial to your pupils and many others in helping them to overcome their test anxiousness. This has often hindered pupils from performing up to their optimum ability in their internal and external examinations. Your assistance in granting permission for this study will be highly appreciated,

Yours sincerely, Ogugua Glory (The Researcher)

Appendix D

ABBREVIATED MATHEMATICS ANXIETY SCALE (AMAS)

SCHOOL:_____ CLASS_____

NAME:_____DATE: _____

GENDER: Male ⬭ Female ⬭

DIRECTIONS: Please rate each item in terms of how anxious you would feel during the event specified. Using the following scale, record your answer in the space provided

S/N	ITEMS	5	4	3	2	1
		High anxiety	Quite some anxiety	Moderate anxiety	Some anxiety	Low anxiety
1	Having to use the tables at the back of a maths book					
2	Thinking about an upcoming math test one day before					
3	Watching a teacher work an algebraic equation with blackboard					
4	Taking an examination in a mathematics course					
5	Being given a homework assignment of many difficult problems which is due for the next class meeting					
6	Listening to a lecture in math class					
7	Listening to another student explain a math formula					
8	Being given a “pop” quiz in a math class					
9	Starting a new chapter in a math book.					

Appendix E

Outline of Systematic Desensitisation Treatment Programme

Week 1:

Introduction and familiarization with pupils

Week 2:

A. Explanation of anxiety and Mathematics anxiety.
B. Explanation of major mathematical obstacles
C. Discussion and review.

Week 3:

Relaxation training and scene instruction

Week 4.

A. Understanding why all major body parts must be relaxed for proper learning to be achieved.
B. General practice with the pupils

Week 5.

A. Discussion of hierarchy of anxiety provoking items
B. General practice.

Week6

A. Focusing on review and success when doing mathematics
B. General practice skills

Week 7.

A. Creating success from anxiety.
B. Discussion on learnt skills

Week 8.

A. Climbing the test anxiety ladder and the use of index cards.
B. Focusing on Review and Success.

Appendix F

Outline of Self-Management Treatment Programme

Week 1:

A. Understanding Test and Test Anxiety

B. Active Reinforcement

C. Review and Discussion

Week 2:

A. Self-Monitoring for Test Anxiety Continues

B. Developing self-esteem and personal confidence

C. Reinforcement

D. Review and Discussion

Week 3:

A. Recording Behaviour

B. Regular Behavioural Check

C. Changing the thought process

D. Review and Discussion

Week 4:

Recording behaviour

C. Review and Discussion

Week 5:

A. Self-evaluation and Self-reinforcing technique

B. Review of Practiced techniques

Week 6.

A. Self-evaluation and review of practiced techniques

B. General discussion with the pupils

Week 7

A. Self-study

B. General practice on how to study on ones' self.

Week 8

A. General review of all skills adopted in the previous weeks.

Appendix G

Self- Management Form

Student

Name:_____ Date:_____

My goal is: _____

The number of times I was working on my

Task:_____

My goal is to be working on my task:_____

I met my goal (yes or no):_____

I will reinforce myself when I meet my goal by

Participation Form

Date:_____ No_____

With regards to my participation, I was:

Extremely Happy ☐ Very Happy ☐ Happy ☐

Extremely Unhappy ☐ Very Unhappy ☐ Unhappy ☐

What I like most about my participation is: _____

What I don`t like most about my participation is _____

Means

Report

TREATMENT GROUPS		PRETEST	POSTTEST
SD	Mean	41.8947	17.8421
	N	38	38
	Std. Deviation	1.15757	5.91620
SM	Mean	41.5250	19.3000
	N	40	40
	Std. Deviation	1.83956	3.88422
CONTROL	Mean	40.0500	32.2000
	N	40	40
	Std. Deviation	3.11284	4.65309
TOTAL	Mean	41.1441	23.2034
	N	118	118
	Std. Deviation	2.32884	8.09512

Analysis of Covariance

Between Subjects Factors

		Value Label	N
TREATMENTGROUPS	1.00	SD	38
	3.00	CONTROL	40

Tests of between-subjects effects

Dependent Variable: POSTTEST

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4045.042[a]	2	2022.521	71.834	.000
Intercept	53.931	1	53.931	1.915	.170
PRETEST	27.777	1	27.777	.987	.324
TREATMENTGROUPS	3709.285	1	3709.285	131.742	.000
Error	2111.676	75	28.156		
Total	55710.000	78			
Corrected Total	6156.718	77			

a. R Squared = .657 (Adjusted R Squared = .648)

Analysis of Covariance

Between-Subjects Factors

		Value Label	N
TREATMENTGROUPS	2.00	SM	40
	3.00	CONTROL	40

Tests of Between-Subjects Effects

Dependent Variable: POSTTEST

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3416.597[a]	2	1708.298	97.842	.000
Intercept	23.467	1	23.467	1.344	.250
PRETEST	88.397	1	88.397	.9875.063	.27
TREATMENTGROUPS	3365.443	1	3365.443	131.742	.000
Error	1344.403	77	17.460	192.754	
Total	57806	80			
Corrected Total	4761.000	79			

a. R Squared = .718(Adjusted R Squared = .710)

Analysis of Covariance

Between-Subjects Factors

		Value Label	N
TREATMENTGROUPS	1.00	SD	38
	2.00	SM	40

Tests of Between-Subjects Effects

Dependent Variable: POSTTEST

Source	Type III Sum of Squares	df	Mean Square	F
Corrected Model	103.387[a]	2	51.694	
Intercept	3.502	1	3.502	
PRETEST	61.968	1	61.968	
TREATMENTGROUPS	53.813	1	53.813	2.216
Error	1821.485	75	24.286	
Total	28880.000	78		
Corrected Total	1924.872	77		

a. R Squared = .054 (Adjusted R Squared = .028)

Means

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	`N	Percent	N	percent
PRETEST*GENDER	40	100.0%	0	0.0%	40	100.0%
POSTTEST*GENDER	40	100.0%	0	0.0%	40	100.0%

Report

GENDER		PRETEST	POSTTEST
MALE	Mean	41.0500	19.1500
	N	20	20
	Std. Deviation	2.35025	4.24605
FEMALE	Mean	42.0000	19.4500
	N	20	20
	Std. Deviation	.97333	3.59056
TOTAL	Mean	41.5250	19.3000
	N	40	40
	Std. Deviation	1.83956	3.88422

Analysis of Covariance

Between-Subjects Factors

		Value Label	N
TREATMENTGROUPS	1.00	MALE	20
	2.00	FEMALE	20

Tests of Between-Subjects Effects

Dependent Variable: POSTTEST

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	85.271[a]	2	42.636		.055
Intercept	16.226	1	16.226		.282
PRETEST	84.371	1	84.371		.017
GENDER	2.209	1	2.209	.162	.689
Error	503.129	37	13.598		
Total	15488.000	40			
Corrected Total	588.400	39			

a. R Squared = .145 (Adjusted R Squared = .099)

Means

Report

GENDER		PRETEST	POSTTEST
MALE	Mean	41.6667	17.6667
	N	18	18
	Std. Deviation	1.08465	4.57615
FEMALE	Mean	42.1000	18.0000
	N	20	20
	Std. Deviation	1.20961	7.02627
TOTAL	Mean	41.8947	17.8421
	N	38	38
	Std. Deviation	1.15757	5.91620

Analysis of Covariance

Between-Subjects Factors

		Value Label	N
TREATMENTGROUPS	1.00	MALE	18
	2.00	FEMALE	20

Tests of Between-Subjects Effects

Dependent Variable: POSTTEST

Source	Type III Sum of Squares	df	Mean Square	F
Corrected Model	1.053[a]	2	5.26	
Intercept	8.660	1	8.660	
PRETEST	.000	1	.000	
GENDER	1.015	1	1.015	.027
Error	1294.000	35	36.971	
Total	13392.000	38		
Corrected Total	1295.053	37		

a. R Squared = .001 (Adjusted R Squared = .056)