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**EFFECTS OF MOTIVATIONAL ENHANCEMENT THERAPY AND
SELF-MONITORING SKILL TRAINING ON MATHEMATICS
LEARNING READINESS AND GAINS AMONG SCHOOL-GOING
ADOLESCENTS IN OYO STATE, NIGERIA**

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**A THESIS SUBMITTED TO THE DEPARTMENT OF COUNSELLING AND
HUMAN DEVELOPMENT STUDIES, FACULTY OF EDUCATION**

**IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD
OF DOCTOR OF PHILOSOPHY (Ph.D) OF UNIVERSITY OF IBADAN,
IBADAN, NIGERIA (SPECIALISED IN ASSESSMENT AND TESTING)**

MARCH, 2016

CERTIFICATION

This is to certify that this thesis is an original work carried out by MURAINA, KAMILU OLANREWAJU (Matric No: 160999) in the Department of Counselling and Human Development Studies, Faculty of Education, University of Ibadan under my supervision.

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.....

Date

DEDICATION

This work is dedicated to Almighty Allah for the gift of life, my late Parents: Mr. and Mrs. Muraina Olaifa Fasipe (May Allah grant them Al-Jannat Firdaus) and my amiable Family.

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ABSTRACT

Mathematics is a compulsory subject in schools, however mathematics learning readiness and gains of school-going adolescents in the subject are on the decline in Oyo State, Nigeria. The inability of students to proceed to higher institutions of learning due to failure in mathematics has always resulted in frustrations. Previous studies had focused on factors influencing mathematics learning readiness and gains to the neglect of intervention strategies. This study, therefore, determined the effects of motivational enhancement therapy (MET) and self-monitoring skill training (SMT) on mathematics learning readiness and gains of school-going adolescents in Oyo State, Nigeria. The moderating effect of gender and mathematics anxiety (MA) were examined.

The study adopted pretest-posttest, control group, quasi-experimental design with a 3x2x2 factorial matrix. Multi-stage sampling frame was used in the study. Three local government areas (LGAs): Itesiwaju, Atisbo and Saki West in Oyo State were randomly selected. One secondary school was randomly selected from each LGA and 30 students with low Mathematics learning readiness and gains in the screening instrument were purposively selected from each school. Participants were randomly assigned to MET (30), SMT (30) and Control (30) groups; while the treatments lasted eight weeks. Learning Readiness Scale ($r=.83$), Mathematics Anxiety Scale ($r=.88$), Attitude to Mathematics Scale ($r=.83$) and Mathematics Learning Gains Test ($r=.79$) were used for data collection. Data were subjected to Analysis of Covariance and Duncan Post-hoc test at 0.05 level of significance.

There was a significant main effect of treatment on students' mathematics learning readiness ($F_{(2, 77)} = 64.17, \eta^2 = .625$). Participants in MET ($\bar{x} = 75.23$) had better mathematics learning readiness than those in SMT ($\bar{x} = 71.10$) and control group ($\bar{x} = 39.67$). There was also main effect of MA on students' mathematics learning readiness ($F_{(1, 77)} = 18.87, \eta^2 = .197$); participants with low MA ($\bar{x} = 70.87$) benefited more compared with high MA ($\bar{x} = 55.22$). Gender had no main effect on students' mathematics learning readiness. There was a significant 2-way interaction effect of treatment and MA on students' mathematics learning readiness ($F_{(2, 77)} = 4.22, \eta^2 = .099$). There was a significant main effect of treatment on students' mathematics learning gains ($F_{(2, 77)} = 82.22, \eta^2 = .681$). Participants in MET ($\bar{x} = 66.10$) had better mathematics learning gains than those in SMT ($\bar{x} = 60.77$) and control group ($\bar{x} = 22.73$). There was also main effect of MA on students' mathematics learning gains ($F_{(1, 77)} = 31.30, \eta^2 = .289$); participants with low MA ($\bar{x} = 61.54$) benefited more in the treatment than those with high MA ($\bar{x} = 40.94$). Gender had no main effect on students' mathematics learning gains. There was significant 2-way interaction effect of treatment and MA on students' mathematics learning gains ($F_{(2, 77)} = 7.87, \eta^2 = .170$).

The motivational enhancement therapy and self-monitoring skill training enhanced Mathematics learning readiness and gains of students. Educational/Counselling psychologists should adopt both interventions to improve mathematics learning readiness and gains of school-going adolescents in Oyo State, Nigeria.

Keywords: Motivational enhancement therapy, Self-monitoring skill training, Mathematics learning readiness, Learning gains

Word count: 475

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

All subjects taught in the school system is the representation of the curriculum and the curricula are designed towards meeting the need of people at large. It is due to the relevance of Mathematics to social, political, economic, scientific, technological and human development that makes it one of the core and compulsory subject for the students at all level of Education. In Junior Secondary School (JSS) also, Mathematics is one of the compulsory subjects that students must offer not minding whether such students intend to be in science, commercial, arts or social science in Senior Secondary School (SSS) class. In secondary school curriculum according to National Policy on Education (2004), Mathematics is one of the core subjects that for the students to further their studies in Senior Secondary School (SSS) or institutions of higher learning especially in University, students are expected to have credit in it. This makes Mathematics one of the essential subjects for students' advancement. However, Mathematics is one of the subjects that is taken very seriously in the school system, irrespective of country or level of education.

It has been described as a model of thinking which encourages learners to observe, reflect and reason logically about a problem and in communicating ideas, making it the central intellectual discipline and a vital tool in science, commerce and technology. In the words of Salman (2005), Mathematics is a precursor of scientific discoveries and inventions. It is the foundation for any meaningful scientific endeavour and any nation that must develop in science and technology must have a strong mathematical foundation for its youths. In terms of curriculum relevance, Mathematics is compulsory at the secondary school level and a prerequisite for moving from the Junior Secondary School (JSS) to the Senior Secondary School (SSS); just as at the tertiary level of education, a sound background in Mathematics is a necessary condition for the study of all science, technology and social science based courses, as required by the Unified Tertiary and Matriculation Examination (UTME).

Learning readiness is the preparedness of school-going adolescents to learn and solve Mathematics in the school. Learning readiness serves as functions which include social expressions, value expressive, utilitarian, and defensive functions, for the people who hold them. In the greater realm of social psychology, learning readiness is typically classified with

affective domain, and is part of the larger concept of motivation (Wang & Ye, 2015; Greenwald, 2009). A student's constant failure in Mathematics in particular makes him/her believe that he/she can never do well on the subject thus accepting defeat. On the other hand, his successful experience can make him/her to develop a positive learning readiness towards learning the subject. This suggests that student's learning readiness towards Mathematics need to be enhanced through psychological interventions. It has in fact been confirmed that effective teaching strategies can create positive learning readiness on the students towards school subjects (Akale, 1997; Akinsola, 1994).

Learning gains on the other hand is the outcomes and performance of students in the Mathematics tests or examinations. The learning gains is a concept that has always being used synonymously with some concepts such as learning outcomes, academic achievement, academic performance and academic success among others (Adejumo, Oluwole & Muraina, 2015). The term is used in this study as the level of academic performance of students in Mathematics and this is approached from cognitive domain of the students. This is because it is well believed that learning has not being taken place if the learners have not been able to achieve or gain from instructional contents of the teacher. But the fact remain that the level at which the individual students gains in the teaching instruction differs and this always call for consistent research to find out likely problems associated with poor learning gains among the students.

Mathematics learning readiness and gains of students in Nigeria has been a source of concern and research interest to educators, government and parents. This is so because of the great importance that Mathematics has on the progress and national development of the country. Mathematics Teachers, parents and Government always complain of students' low performance at both internal and external examination in Mathematics. The consequences of this results into wastage of resources, lack of confidence, low self-esteem, suicidal ideation, depression and high criminal activities as a result of consistent Mathematics failure among students in Nigeria (Onocha & Okpala, 1985).

Despite the recognition accorded to Mathematics and its relevance, Elekwa (2010) remarked that students exhibit poor readiness towards Mathematics, even when they know that they need it to forge ahead in their studies and in life. Such students who have already conditioned their minds that Mathematics is a difficult subject are usually not serious in the learning of Mathematics and therefore perform poorly in Mathematics tests and examination.

Poor Mathematics learning readiness makes students to avoid learning of Mathematics in the school and the avoidance of Mathematics as a result of poor learning readiness restrict the students the opportunity to fit into the choice of discipline and career nowadays (Wang & Ye, 2015). This is because for learning to be effective, the components of teaching and learning must be accomplished for which are the learners and teachers. Low readiness of students among other students' factors leads to incessant poor performance of students in Mathematics.

Nwoji (1999) declared that students in Junior Secondary School classes face a lot of challenges regarding Mathematics learning readiness and gains as results of information shared by their predecessor regarding the subject difficulty. It is also at this level that the erroneous information gathered could be clarified in order to enhance their Mathematics learning readiness and gains. However, available data from State Ministries of Education cited by Areola (2006) showed consistent poor performance of students in Mathematics in Basic Education Certification Examination (BECE). For example, the percentage pass of students in BECE with credit and above in Mathematics between 2008 and 2014 showed 38.1%, 31.2%, 36.5%, 33.7%, 35.1%, 39.3% and 41.1% respectively (Oyo state Ministry of Education, 2014). This simply means that the poor Mathematics learning readiness and gains among students could easily be traced back to when the students are still in JSS classes.

Also, since the enormity of this poor Mathematics learning readiness and gains are easily perceived at SSCE results, the researcher further provided the results of students' Mathematics performance over years from Examinations bodies. Really, a solid foundational Mathematics learning at the primary and JSS level of education is bedrock upon which strong future academic performance in secondary and tertiary education are laid (Onocha & Okpala, 1985). Akinsola and Animasahun (2007) writing on effective learning of Mathematics at Junior Secondary School level stated that Mathematics teachers should be aware of certain rules which facilitate the selection of approaches of imparting knowledge to students. Thus, observed that in selecting the methodology for a Mathematics lesson the teachers should consider among other things innovative teaching strategies to enhance students' academic performance in the subject.

The consistent mass failures of most secondary school leavers in May/June examinations conducted by West African Examination Council (WAEC), National Examination Council (NECO) and National Business and Technical Examination Board (NABTEB) prompted the Federal Government to set up a panel to investigate the reported mass failure of

students in the 2009 Senior Secondary Certificate Examination (SSCE). Of all the candidates who sat for the 2009 May/June SSCE, 84% failed (Information on Nigeria Education, 2009). The implications of this on the candidates' future and the nation's manpower development should be a cause for concern for the country's leaders, stakeholders in the education industry and the nation as a whole. Different researchers have identified different factors adduced as being responsible for the consistent poor performance of students in Mathematics. These include among others lack of proper digestion and utilization of research findings by Mathematics teachers, sex-stereotyping, low learning readiness and school factors (Nwoji, 1999).

Analysis of school certificate Mathematics examination results shows that students' performances in Mathematics are consistently poor. Uwadiae, (2014) reported that less than 42% of registered candidate for NECO 2013 obtained credit pass in Mathematics. Even the SSCE results released by WAEC and NECO also for 2012 indicated poor achievement of students in Mathematics. According to Olunloye (2010), this ugly trend of high failure rate in Mathematics is a national disaster. Therefore, feasible ways of improving performance has remained an area of great concern for researchers. From available statistics and as shown in table 2.1, the national average performance of students in Mathematics for the past ten years (2004 to 2014) ranged between 30.1% to 35.8%. Uwadiae (2014) in support of the above assertion noted that it was only 48.9% of candidates who sat for November/December 2013 West African Senior School Certificate Examination (WASSCE) that has credit while the rest of 51.1% of the candidates failed in Mathematics.

The 2014 May/June SSCE results also recorded mass failure by students across the country. In Mathematics, 1,242,162 students sat for the examination with only 118,254 representing 9.52% obtaining distinction, 80,741 representing 6.50% got credit while 519,224 representing 41.8% got pass, 483,201 representing 38.9% failed and 40,494 representing 3.26% were involved in malpractice. By implication, only 16.02% (distinction and credit percentage) is qualified for admission into universities and polytechnics. 2015 WAEC result also showed 38.68% pass above credit while 61.32% of the students failed in five core subjects including Mathematics.

Poor achievement in Mathematics in Nigerian secondary schools has assumed alarming proportions and caused a lot of concern for many years. Areola (2006) found that the

performance of students in Mathematics was generally poor in all of the nine states in Nigeria where she carried out an evaluation study on the implementation of science programme in Nigerian schools. In a similar manner, Olatoye (2002) found out that the students' Mathematics achievement in Oyo State secondary schools was generally poor with the overall mean score being 31.3%. Unfortunately also, 2014 WASSCE showed that Oyo state took 24th position (with 19% score) and this falls at the last position among the six (6) states in Southwestern, Nigeria.

However, different researchers and scholars have passed the blame of poor performance in secondary school to students because of their low retention, self-concept, depression, self-efficacy, truancy, poor learning readiness, parental factors, peer influence, low achievement motivation and the likes (Aremu & Sokan, 2003; Aremu & Oluwole 2001; Adeyemo, 2001, 2005; Akinsola & Animasahun, 2007; Osiki & Busari, 2002; Salami, 1999, 2008). Mathematics as one of the core subjects in secondary schools is facing some challenges and that is why Adebule (2004) concludes that Mathematics education in Nigeria has persistently been experiencing one form of problem or the other, particularly in relation to the general poor learning readiness and performances of students. According to him, such academic problems include students' unparalleled hatred, indifference, anxiety and poor learning readiness, teachers' dissatisfaction, poor environment, non-availability of appropriate textbooks and poor method of teaching.

Hopper (2005) and Phillips (2000) support this view in their assertion that Mathematics to some students is often associated with pain and frustration and a decrease in the ability to perform higher mental activities and perceptual processes (Goleman, 1996). Akinsola, Tella and Tella (2007) also recognize that many students refer to Mathematics as being difficult. Moreover, students' prior negative experiences in Mathematics class and at home when learning Mathematics are often transferred, causing a lack of understanding of Mathematics (Taiwo, 2014). The deplorable state of Mathematics achievement is attributed to a number of factors such as attitude of students; lack of instructional resources (Yara & Otieno, 2010); instructional techniques (Olulonye, 2010; Wang & Ye, 2015) among others. In view of these, the present study intends to examine the effects of motivational enhancement therapy and self-monitoring skill training on Mathematics learning readiness and gains among school-going adolescents.

Motivational enhancement therapy (MET) is a therapeutic approach based on the premise that students will best be able to achieve change when motivation comes within

themselves rather than being imposed by the stakeholders. Motivational enhancement therapy (MET) was developed by Miller and Rollnick (1991). Motivational enhancement therapy in this study refers to the process of developing and improving positive eagerness and motive of students towards success in Mathematics. The goal is to increase the achievement motivation of students towards learning readiness and gains in Mathematics. In motivational enhancement therapy, participants are given guidance on how to think, talk and act like a person with high achiever and then examine carefully the extent to which they want to plan their lives in the immediate future.

Researchers have used motivational enhancement therapy to assist in improving the performance of a number of different childhood populations, such as learning disabled students among others (Chan, 2001; Graham & MacArthur, 2008; Harris & Graham, 2005), reading and attributions disabled and impulsive children (Guevremont, Tishelman, & Hull, 2005). Although the use of this technique encompasses a variety of domains, such as cognitive skills and affective skills (Chan, 2001), an important area of application is learning gains. Motivational enhancement therapy has been shown to improve the learning gains of a number of populations of disordered children, including children displaying autistic characteristics. In this current study, the researcher assumes that MET could be utilized to elicit desirable positive performance among the secondary school students in Mathematics.

Appelh (1999) observes that poor learning readiness of the students due to poor skill training and motivation are considered as the main reasons for students' poor performance at public examinations. The inability of students to engage actively in the learning process tends to dispose the students to constant rote learning and examination malpractice leading to their poor academic performance. In relation to the above assertion, Biehler and Snowman (1990) posit that absence of motivational enhancement therapy creates difficulty in learning process of students in Mathematics. This ultimately results in their resorting to rote and blind memorization of concepts to pass examination.

Furthermore, Owolabi (2003) observes that the conventional teaching method in most Nigerian classrooms is more teacher-centred than learner centred. Emphasis seems to be on teaching than learning with less attention to the process of learning or how the students learn. This has dwarfed the students' creative thinking and motivation which is necessary in today's school environment. Some authors, like Montague (2003) and Swanson (1999) had expressed

the opinion that students who have poor learning readiness do not process mathematical problem information effectively or efficiently. They either lack or do not apply the resources needed to complete complex cognitive activity. These students generally lack motivational enhancement training that help successful students understand, analyze, solve and evaluate problems.

Self-monitoring skill training (SMT) refers to training that makes the students to set goals, observe and record the occurring and non-occurring behaviour in the goals set for their learning. This skill training was developed by Flavell (1979) as one of the sub-components of metacognitive skill training among which other are self-regulated, self-control, self-evaluation and self-judgment. Self-monitoring is a two-stage process that involves observing and recording. The student needs to determine if the target behaviour did or did not occur. Then, the student self-records some feature of the target behaviour (Mace, Belfiore & Huchinson, 2001). He or she can either record the number of occurrences of a target behaviour to be decreased (e.g., getting out of one's seat) or to be increased (e.g., time on task). Then the student and teacher together determine an acceptable number of occurrences and reinforcement for obtaining the agreed upon number. Sometimes the simple act of recording increases awareness enough to modify the behaviour; in other cases, the reinforcer is critical in reducing or increasing the occurrence of behaviour. Self-monitoring moves beyond the recording of a behaviour to the evaluation of performance. Self-monitoring involves a student comparing his or her performance relative to a set criterion.

The concept of self-monitoring in learning has gained importance with the study of factors causing academic failure of low skilled and underperforming students. Related studies on Mathematics learning readiness and gains pointed out that students with low academic success have lower level of self-monitoring skill and use less learning strategies (Soung, 2001; Busari, 2013). Also, researches have shown that self-monitoring skill training is effective in increasing learning gains (Uredi & Uredi, 2005). Most self-monitoring skill training definitions and models include strategies, processes, responses used by students to improve their learning gains. Self-monitoring skill training is defined as a covert process in cognitive issues of learning and as overt responses in behaviourist view of self-monitoring learning.

In the same vain, students efforts aimed at improving their learning gains by using self-monitored processes is always tagged self-monitoring skill (Zimmerman, 2001). In the

literature, there are relationships among self-monitoring skill training behaviour and learning gains in and attitude towards Mathematics. Stoeger and Ziegler (2005) examined self-monitoring skill training in enhancing learning gains of gifted students and found the training effective. In the study, the training developed by Zimmerman, (1996) was conducted within the framework of regular classroom instruction on the students' learning gains in Mathematics over a six-week period. The results showed that the training was effective for increasing Mathematics learning gains. However, there is dearth of literature on the applications of SMT in enhancing Mathematics learning readiness and gains.

However, several authors have worked on the causative factors associated with poor learning readiness and gains among Nigerian students which are organismic (Adeyemo, 2001, 2005; Busari, 2012; Osiki & Busari, 2002). Also experts in the field of science education and psychology have shown consistently the effects of some factors affecting students learning readiness and gains among secondary school students (Ajayi & Muraina, 2011; Akinsola, 1994; Akinsola & Animasahun, 2007; Taiwo, 2014). Some of these factors examined were gender, interest in schooling, emotional intelligence, Mathematics self-concept, age, depression, self-efficacy among others. In view of these, this study also examined the interactive effects of gender and Mathematics anxiety on Mathematics learning readiness and gains among students.

Gender refers to differences of students in term of being male or female. Gender is a major factor that influences subject interest of students. Further explanation in this context shows that Home Economics, Nursing, Secretary Work, teaching and other feminine related careers have been traditionally regarded as aspects of the school curriculum reserved for females (Umoh, 2003). Based on this, males chose male stereotyped occupations and females chose female stereotyped occupations. According to Umoh (2003) more difficult tasks are usually reserved for males while less difficult ones are considered feminine in a natural setting. Example of this is breaking of firewood, which is often seen as manly task while washing of plates could be seen as a female task at home. Thus at school males are more likely to take to difficult subject areas and challenging problem-solving situations while female on the other hand prefer simple subjects and often shy away from difficult tasks and problem-solving situation.

In Nigeria, gender-achievement studies include Busari (2012) who found that female students perform academically better than their male counterpart. Also, Abiam and Odok (2006)

found no significant relationship between gender and achievement in number and numeration, algebraic processes and statistics. They however found the existence of a weak significant relationship between gender and learning gains in Geometry and Trigonometry (Hopkins, 2004). Ekeh (2003) discovered that male students performed better than females in science and Mathematics. These differences in performance can be attributed to gender which encourages male and female students to show interest in subjects relevant and related to the roles expected of them in the society. Studies have shown that gender has negative impact on cognitive performance of students as girls perform better without the boys and vice versa (Okon, 2003; Wang & Ye, 2015).

Gender differences in Mathematics achievement begin to appear at the upper primary school level and increase in secondary schools (Makau, 2004; Obura, 2001). These differences are caused by an interaction of factors within and outside the school as well as by the students' background (Makau & Coombe, 2004). Students' efforts, ability and their teacher's effectiveness greatly influence their performance in Mathematics but unlike in developed countries where teaching resources are in abundance, in developing countries Mathematics performance is influenced more by current factors within a school.

Mathematics anxiety refers to the feelings of tension and anxiety that interfere with the manipulation of numbers and solving mathematical problems in an open variety of societal life and academic situations. Although there is on-going debate about the causes of Mathematics anxiety, achievement and performance were improved when Mathematics anxiety was reduced (Wilbert, 2006). Vinson (2001) also noted that Mathematics power is increased when anxiety is diminished. Mathematics anxiety affects student achievement and attitude towards Mathematics and it may also lead to poor performance and avoidance of Mathematics (Hembree, 2009). Many people think of Mathematics as a punishment or something that induces stress. Mathematics anxiety has been proposed as an explanation for poor Mathematics achievement.

In separate meta-analysis studies, Hembree (2009) and Ma (1999) reported that Mathematics anxiety was related to Mathematics performance among individuals at various ages. Mathematics anxiety has been associated with Mathematics performance before and during secondary school (Green, 2000). Mathematics anxiety is common among secondary school students but more so among students majoring in the arts than those majoring in science (Wang & Ye, 2015).

Aprebo (2002) asserted that poor achievement in Mathematics emanated from anxiety and fear. Mathematics phobia, he said, has been an academic disease whose symptoms are always expressed on the faces of the learners in the Mathematics classroom. Not surprisingly, Mathematics anxiety is inversely related to students' learning readiness (Ikegulu, 2000). Green (2000) reported that although Mathematics anxiety was significantly related to Mathematics learning readiness, other factors such as test anxiety, Mathematics placement test scores, and teacher feedback were stronger predictors of students' learning readiness. Bassarear (2006) found that poor performance and readiness in Mathematics was related to high Mathematics anxiety among medium and high ability students; however, highly anxious students with low ability actually outperformed lower ability students who expressed less anxiety. Students with less anxiety may have more strategies at their disposal than their more anxiety-prone counterparts.

Despite the effort of scholars and researchers in finding lasting solution to the problems of poor learning readiness and gains among students in the school, little studies have concentrated on the use of motivational enhancement therapy and self-monitoring skill training in enhancing students learning gains especially in Mathematics and sciences. However, despite several studies on learning gains of students in the school (Adejumo, Oluwole & Muraina, 2015; Busari, 2013; Taiwo, 2014 among others), researchers have not concentrated on the issues that are related to students learning readiness. Existence of different studies aimed at using metacognitive skill training in enhancing learning gains among students (Gurb, 2000; Meneghetti, Debeni, & Cornoldi, 2007), more studies that use other aspect of metacognitive skills training (that is self-monitoring) with any other therapy to enhance Mathematics learning readiness and gains is still needed. Also, studies related to the use of self-monitoring skill training and motivational enhancement therapy were majorly on reduction of substance abuse and were studied mostly outside Nigeria and the need to use these intervention strategies in enhancing learning readiness and gains make this present study a peculiar one.

Moreover, the moderating variables selected (i.e gender and Mathematics anxiety) were mostly used in some studies not on Mathematics learning readiness and gains. Such researches conducted on learning gains in Mathematics used only aspect of Mathematics such as Algebra, Calculus, Simultaneous Equation, Trigonometry and word problem among others. In order to fill the gaps in the previous study and add more to the existing literatures, the present study

intends to examine the effects of motivational enhancement therapy and self-monitoring skill training on Mathematics learning readiness and gains among school-going adolescents in Oyo State, Nigeria.

1.2 Statement of the Problem

The importance of science, particularly Mathematics in the technological development of a nation cannot be over-emphasized. Despite the importance of Mathematics, students have negative perception that Mathematics is a very difficult subject and as much as possible students tend to avoid taking Mathematics courses which make them to develop poor learning readiness toward Mathematics. Poor learning readiness towards Mathematics severely restricts the students to a limited field of study and jobs they can find nowadays.

Poor Mathematics learning readiness makes students to avoid so many field of study in the Universities, Polytechnics and Colleges of Education across science and non-science based courses. This is because Mathematics is needed in all disciplines and also instruments that ease the learning of other discipline/subjects and prepares individual for the future. Poor Mathematics learning readiness also makes the student to perform poorly in the subjects and restrict their opportunity to continue their studies in the higher institution of learning most especially University. Inability of students to proceed their studies in the higher institution of learning bring about academic dropout which has a lot of implications to the society such as disgrace to the family, disgrace to the students, low self-esteem, examination malpractices, depression, suicidal ideation, low man power and involvement of students in different kind of hooliganism and criminal behaviour among others.

Moreover, as the world's reliance on technology continues to grow, so also has the demand for people who can think in the abstract terms of Mathematics and science are needed across different field and level of education in the country. The significance of Mathematics in producing versatile and resourceful graduates that are needed for economic development cannot be over-emphasized. The Science Teachers Association of Nigeria referred to Mathematics as the central intellectual discipline of the technology societies. In his submission, Oduoro (2002) affirmed that the knowledge of science remains superficial without Mathematics. It therefore means that, the position of Mathematics in secondary school curriculum in Nigeria is important for scientific development.

However, it is disheartening that research and data from National Examination Bodies like West African Examinations Council (WAEC), National Examination Council (NECO) among others have shown a consistent poor performance in this subject. Majority of school-going adolescents often dread and show negative attitude towards Mathematics and the trends of their achievement in the Senior Secondary School (SSS) certificate examination is also a source of worry to the stakeholders. Poor learning readiness and achievement in Mathematics in Nigerian secondary schools has assumed alarming proportions and caused a lot of concern for many years. This is because Mathematics is today part of the basic requirements for entrance into the different stages of higher educational system since it is the bedrock of all science and technologically-based subjects. It affects all aspects of human life at different degrees. This consistent poor performance by students in Mathematics calls for serious national action to remediate the situation.

Despite different interventions to correct this problem of poor Mathematics learning readiness and gains, the problems seem to continue because these interventions are outside the learner. As a way out, stakeholders in Education described that the incessant poor Mathematics performance in Nigerian secondary schools has called for the use of psychological interventions. Therefore, there is need to find more effective skill trainings and therapy that are likely to improve learning readiness and gains in senior secondary Mathematics. Also, there has been very little research done in Nigeria in this area. This study therefore concentrates on the effects of motivational enhancement therapy and self-monitoring skill training on Mathematics learning readiness and gains among school-going adolescents in Oyo State, Nigeria.

1.3 Purpose of the Study

The main purpose of this study is to investigate the effects of motivational enhancement therapy and self-monitoring skill training on Mathematics learning readiness and gains among school-going adolescents in Oyo State, Nigeria. Specifically other purposes include to;

1. find out the main effect of treatment on students' Mathematics learning readiness and gains
2. investigate the main effect of gender on students' Mathematics learning readiness and gains
3. determine main effect of Mathematics anxiety on students' Mathematics learning readiness and gains
4. investigate the interaction effect of treatment and gender on students' Mathematics learning readiness and gains

5. investigate the interaction effect of treatment and Mathematics anxiety on students' Mathematics learning readiness and gains
6. find out the interaction effect of gender and Mathematics anxiety on students' Mathematics learning readiness and gains
7. examine the interaction effect of treatment, gender and Mathematics anxiety on students' Mathematics learning readiness and gains

1.4 Significance of the Study

This study will help the public and private schools to ascertain the effects of motivational enhancement therapy and self-monitoring skill training on students' Mathematics learning readiness and gains in the school. Also, the study will make the school management to have proper understanding of the problems associated with Mathematics learning and help them to utilize psychological interventions and strategies towards the eradication of the cankerworm. And this will then help in reducing the rate of academic failure among secondary school student in Mathematics.

The study will aid the counseling/educational psychologists to understand the implications of motivational enhancement therapy and self-monitoring skill training on students' Mathematics learning readiness and gains. In that, the study will add more to the therapeutic interventions of counseling/educational psychologist on how to improve the Mathematics learning readiness and gains among school-going adolescents in the school.

The study will provide an insight understanding for the students on motivational enhancement therapy and self-monitoring skill training on their Mathematics learning readiness and gains in the school, this will help the students to adopt effective learning skills and enhance their Mathematics learning gains in the school. The study will also enable the stakeholders in education to think on the effects of gender discrimination on Mathematics learning readiness and learning gains among school-going adolescents. This will help in reducing the problems of gender differentiation which constitute to high Mathematics anxiety among school-going adolescents in the school.

This will also enable the parents and guardians to discover the effects of Mathematics anxiety on students' Mathematics learning readiness and gains in the school. This will help the stakeholders in the school to assist the students in overcoming the challenges of Mathematics anxiety which will in turn enhance the students' Mathematics learning readiness and gains in

the school. The study will also enable the guardians to avoid gender discrimination on Mathematics learning among school-going adolescents.

The study of this type will further enable the teachers to discover the effects of motivational enhancement therapy and self-monitoring skill training on Mathematics learning readiness and gains among students in the school. This will help the teachers to assist the students to develop effective treatment interventions in enhancing Mathematics learning readiness and gains of students in the school. Through this study, the students, teachers as well as other stakeholders in education will be able to adopt the effective skill training that could help in enhancing the Mathematics learning readiness and gains of students in the school. This will help in devising appropriate strategies through which Mathematics anxiety and phobia among students could be eliminated in the school.

The study will help the experts in educational testing/evaluation and other Mathematics inclined disciplines to make use of motivational enhancement therapy and self-monitoring skill training in addition with other existing strategies in enhancing the students' learning readiness and gains among students. Also, the study will add more to the existing interventions and reveal more related implications on how to improve the Mathematics learning readiness and gains of students in the school.

The effects of two treatment interventions (motivational enhancement therapy and self-monitoring skill training) on Mathematics learning readiness and gains will enable the government and the general public to be aware of these skill training and work towards better effective usage to improve learning readiness and gains of students not only in Mathematics but also in the other science and non-science related subjects in the school. It is important to note that findings in this study will also serve as a source of reference for other researchers who may want to conduct the same or similar study in other subjects or areas in Nigeria. However, the study will fill the gap in the previous study and add more to the existing literatures.

1.5 Scope of the Study

The study investigated the effects of motivational enhancement therapy and self-monitoring skill training on Mathematics learning readiness and gains among school-going adolescents in Oyo State, Nigeria. Also, the study examines the interaction effect of moderating variables (gender and Mathematics anxiety) on the dependent variables (Mathematics learning readiness and gains) among school-going adolescents. Oyo state has four educational zones

namely Ibadan/Ibarapa zone, Oyo zone, Ogbomosho zone and Saki zone with thirty three (33) Local Government Areas. Ibadan/Ibarapa has fourteen (14) Local Government Areas, Oyo has four (4) Local Government Areas, Ogbomoso has five (5) Local Government Areas and Saki has ten (10) Local Government Areas.

1.6 Operational Definition of Terms

In order to ease the understanding of some concepts, terms or terminologies, the following terms have been operationally defined as they have been used within the context of this study.

Motivational Enhancement Therapy: This refers to the treatment given to school-going adolescents in order to develop and improve positive eagerness and motive towards success in Mathematics.

Self-monitoring Skill Training: This is the training that makes the school-going adolescents to set goals, observe and record the occurring and non-occurring behaviour in the goals set for their Mathematics learning and then motivate their cognition and behaviour towards the accomplishment of the goals.

Mathematics Learning Readiness: This refers to the preparedness of school-going adolescents to learn and solve Mathematics problems in the school.

Mathematics Learning Gains: This can be described within the context of this study as the outcomes and performance of school-going adolescents in the Mathematics tests and examinations he/she has been exposed to. This was measured by the results/scores that the students obtained in Mathematics learning gains test (MLGT).

Mathematics Anxiety: This is the feelings and tension of school-going adolescents which interfere with the manipulation of numbers and solving of mathematical problems in a variety of social and academic situations.

School-Going Adolescents: These are students in Junior Secondary School Two (JSS 2).

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter deals with review of related literature. These were done both theoretically and empirically.

2.1 Theoretical Review

2.1.1 Learning Readiness

Learning can be determined through performance on external test. The word learning readiness is defined within the framework of social psychology as a subjective or mental preparation for learning action. According to Souza, Barros and Marcos (2010), learning readiness defines outward and visible postures of human beliefs towards learning. Mathematics learning readiness determines what each individual will see, hear, think and do in Mathematics class. According to them, Mathematics learning readiness means individuals prevailing tendency to respond either favourably or unfavourably to Mathematics learning. It can either be positive or negative.

Nyenwe (2009) stated that education is the principal means of nation building and the primary tool for the survival of any society. Readiness is concerned with an individual way of thinking and behaving and this has serious implications for learner, the teacher, the immediate social group with which individual learning relates and the school system as a whole (Yara, 2009). According to Ebenezar (2015) learning readiness is the way individual thinks and feels about something. It also the way someone behave and the position he/she hold. Readiness can be formed as a result of some opinion or by following the examples of someone like parents, teachers, peer group and friends. Learning readiness can either be negative or positive.

Readiness as a concept is concerned with an individual way of thinking, acting and behaving toward object or subject. It has very serious implications for the learner, the teacher, the immediate social group with which the individual learner relates and the entire school system. Readiness is formed as a result of some kind of learning experiences. They may also be learned simply by following the example or opinion of parent, teacher or friend. This is mimicry or imitation, which also has a part to play in the teaching and learning situation (Adejumo, Oluwole & Muraina, 2015; Wang & Ye, 2015). In this respect, the learner draws from his teachers' disposition to form his own readiness, which may likely affect his learning gains.

It is generally believed that students' learning readiness towards a subject determines their success in that subject. In other words, favorable learning readiness results to good achievement in a subject. A student's constant failure in a school subject and Mathematics in particular can make him to believe that he can never do well on the subject thus accepting defeat. On the other hand, his successful experience can make him to develop a positive learning readiness towards learning the subject. This suggests that student's learning readiness towards Mathematics could be enhanced through effective teaching strategies. It has in fact been confirmed that effective teaching strategies can create positive learning readiness on the students towards school subjects (Akinsola, 1994; Akale, 1997).

Learning is an essential component of academic learning readiness and gains but every type of learning is not necessarily included in learning readiness and gains. Learning could be in any direction; positive or negative, intentional or accidental. However, learning gains is necessarily positive with reference to the objectives of the study, intentional and outcome of an instructional program. Good academic learning gains is very important not only to students and their parents, but also to institutions of learning, educationists of any progressive nation and other stakeholders. Resultantly much concern is being expressed over the continuous poor academic performance of students in Nigeria, particularly of secondary school students (Ajayi & Muraina, 2011).

Learning readiness are psychological constructs theorized to be composed of emotional, cognitive, and behavioural components. Learning readiness serve as functions including social expressions, value expressive, utilitarian, and defensive functions, for the people who hold them (Newbill, 2005). In the greater realm of social psychology, learning readiness are typical classified with affective domain, and are part of the larger concept of motivation (Greenwald, 2009). Learning readiness is connected to Bandura's (1977) social cognitive learning theory as one of the personal factors that affect learning (Newbill, 2005). The definition of learning readiness depends on the purpose of the usage and the context in which the term is being used. Most readiness researchers include the concept of evaluation as the basis for the definition (Boliner & Wanke, 2002; Eagly & Chaiken, 2003). To Petty and Cacioppo (2006) readiness are general evaluations of people hold in regard for themselves, other people, object and issues. To Greenwald (2009), readiness are pervasive, predict behaviour, are a force in perception and memory, and they serve various psychological functions. The debate of the existence of the

component structure of learning readiness may never be completely resolved because readiness are constructs and are therefore not directly observable (Newbill, 2005). The measurement of readiness is inextricably tangled with theoretical debate on the nature of readiness.

Social psychologists has notice that people respond to objects (ideas) with different degrees of positive to negative evaluations. Responses could be affective (e.g., frown or smiling); cognitive (e.g., stating rational thoughts) or behavioural (clapping or running away). Social psychologists conceived of a driving force behind these responses, and name it “learning readiness”. They proceeded to measure readiness by measuring what they conceived to be the effects of it. It is important to note that all responses are technically behaviour (Ajzen, 2009). Definitions of Mathematics learning readiness is numerous as researchers’ and thinkers’ conceptions, ideas and perspectives vary. According to a point of view, the Mathematics learning readiness is just a positive or negative emotional disposition towards learning Mathematics (Zan & Martino, 2007).

Hart (2009), considering Mathematics learning readiness from a multidimensional point define an individual’s Mathematics learning readiness as a more complex way by the emotions that he/she associates with Mathematics, his/her beliefs towards Mathematics, which could be either positive or negative and how he/she behaves towards Mathematics. Research on Mathematics learning readiness education has been motivated by the belief that something called readiness plays a crucial role in learning Mathematics but the goal of highlighting a connection between positive learning readiness and Mathematics achievement has not been reached conclusively (Zan & Martino, 2007).

Several researchers have recommended incorporating readiness toward learning or the subject matter into studies of cognition and learning gains (Ikegulu, 2008; Miller, 2006). Ikegulu (2000) recommended future research on how learning styles and individual characteristics influence academic performance in Mathematics and other subjects. Miller (2006) suggested further research on Mathematics anxiety and perceived relevance of Mathematics among students. Singh, Granville and Dika (2002) indicated that the relationship between readiness and achievement-related behaviour in Mathematics have not been fully investigated and require more research. Readiness toward Mathematics refers to relatively stable feelings and beliefs about the subject (McLeod, 1992). Studies support the notion that readiness and beliefs about learning, Mathematics, and self are influential to learning and

achievement in Mathematics (Bassarear, 2006; Pajares, 1996). Much of the research conducted involves the study of gender differences and the relationship between readiness and problem-solving (McLeod, 1992).

2.1.2 Learning Gains

Learning gains, predominantly, in academic setting is called learning outcomes, academic achievement, academic performance and academic success among others. It can be defined as attainment of academic areas. Reading and writing language and mathematical functioning are the major domains of learning gains. Learning gains is also defined as knowledge gained or skills developed in the school subjects, usually designated by test scores, marks assigned by teacher or both. It refers to the learning gains made by the students in their academic subjects such as Chemistry, Mathematics or Physics among others. It contrasts with skills developed in such areas as industrial art or physical education (Ololube, 2009). Hence, the students' ability to demonstrate the desired behaviour is considered academic learning gains. Learning gains also refers to the learning gains of objectives described in the curriculum of an educational program. Focus of an educational system is mostly on the objectives. Learning gains is closely related with the concept of learning. However, learning gains has wider meaning as compared to learning. Learning is defined as an enduring change in the mechanisms of behaviour involving specific stimuli and responses that result from prior experience with those or similar stimuli and responses (Adejumo, Oluwole & Muraina, 2015; Busari, 2013).

The term is more appropriate to be used in term of student academic achievement in science and Mathematics. This is because it is well believed that learning has not being taken place if the learners have not been able to achieve or gains from the teaching instructions of the teacher. But the level at which the students gains is what is always differs and make the stakeholder to carryout consistent research to find out likely problems associated with poor learning gains among the students. Learning gains of students in Nigeria has been and is still a source of concern and research interest to educators, government and parents. This is so because of the great importance that education has on the national development of the country. All over the country, there is a consensus of opinion about the fallen standard of education in Nigeria (Adebule, 2004). Parents and government are in total agreement that their huge investment on education is not yielding the desired dividend. Teachers also complain of students' low performance at both internal and external examination. The annual releases of Senior Secondary

Certificate Examination results (SSCE) conducted by West African Examination Council (WAEC) justified the problematic nature and generalization of poor secondary school students' performance in different school subjects.

Poor academic performance according to Aremu (2003) is a performance that is adjudged by the examinee/testee and some other significant as falling below an expected standard. Poor academic performance has been observed in school subjects especially Mathematics and English language among secondary school students (Adesemowo, 2005). Aremu (2000) stresses that academic failure is not only frustrating to the students and the parents, its effects are equally grave on the society in terms of dearth of manpower in all spheres of the economy and politics. Education at secondary school level is supposed to be the bedrock and the foundation towards higher knowledge in tertiary institutions. It is an investment as well as an instrument that can be used to achieve a more rapid economic, social, political, technological, scientific and cultural development in the country. The National Policy on Education (2004) stipulated that secondary education is an instrument for national development that fosters the worth and development of the individual for further education and development, general development of the society and equality of educational opportunities to all Nigerian children, irrespective of any real or marginal disabilities. The role of secondary education is to lay the foundation for further education and if a good foundation is laid at this level, there are likely to be no problem at subsequent levels.

Morakinyo (2003) believe that the falling level of academic achievement is attributable to teacher's non-use of verbal reinforcement strategy. Others found out that the attitude of some teachers to their job is reflected in their poor attendance to lessons, lateness to school, unsavory comments about student's performance that could damage their ego, poor method of teaching and the likes affect pupils' academic performance. Poor academic performance according to Aremu (2000) is a performance that is adjudged by the examinee/testee and some other significant as falling below an expected standard. The interpretation of this expected or desired standard is better appreciated from the perpetual cognitive ability of the evaluator of the performance. The evaluator or assessor can therefore give different interpretations depending on some factors.

Bakare (1994) described poor academic performance as any performance that falls below a desired standard. The criteria of excellence can be from 40 to 100 depending on the

subjective yardstick of the evaluator or assessor. For example, a 70% performance of Senior Secondary School (SSS 3) in junior secondary school (JSS) Mathematics examination is by all standard a very good performance. However, a cursory look at the performance and the individual examined and the standard of the examination he or she took could reveal that the performance is a very poor one. On the other hand, a JSS student's performance of 37% in SSS Mathematics can be said to be a poor performance when in actual fact the performance is by all standards a very good one.

Learning gains is a key factor in education system as it serves a number of very important purposes. Student success is also important for the institutions they attend, for it provides confirmation of the relevance of their mission and the effectiveness of their educational programmes and support services. Of course, student success is important for the students' families, as well as for the future of our society, which is heavily dependent upon a well-educated citizenry (Heather, 2008). Learning gains refers to standardized test scores, grades, and overall academic ability and performance gains (Shawn, 2011; Wang & Ye, 2015). It is used by students to ascertain their academic progression; whether they are passing or failing in any specific areas (Heather, 2008). Performance on assessment can also be used as measure to predict the future performance of students, and be used as an outcome variable for educational research purposes (Amin, Seng & Eng, 2006). Consequently it can be argued that assessment, competence, and academic performance are the key components of the outcome of education (Kuper, Reeves, Albert & Hodges, 2007).

Learning gains is commonly measured by examinations or continuous assessment but there is no general agreement on how it is best tested or which aspects are most important: procedural knowledge such as skills or declarative knowledge such as facts (Ward, Stoker & Murray, 1996). Heather (2008) defines academic performance as a demonstration of a student's level of competence and mastery of a subject through completion of multiple assessment tests of competence in a particular domain of education. In the literature that has taken an outcome-centric approach to examining academic performance, the focus has been the psychometric issues of reliability and validity of individual assessments, (Heather, 2008). It is apparent that the decision-making process of teachers, particularly in the interactive context, is influenced by the judgments they make about their students' cognitions, (Robert & Hoge, 2013). In turn, it

seems reasonable to suggest that the decision-making process proceeds differently when based on accurate teacher judgments than when based on inaccurate teacher judgments.

A number of studies have been carried out to identify and analyse the numerous factors that affect academic performance in various centres of learning. Their findings identify students' effort, previous schooling, parents' education, family income, self motivation, age of student, learning preferences, class attendance and entry qualifications (Aripin, Mahmood, Rohaizad, Yeop & Anuar, 2008) as factors that have a significant effect on the students' academic performance in various settings. The utility of these studies lies in the need to undertake corrective measures that improve the academic performance of students, especially in public funded institutions. The public-funded institutions are under scrutiny especially because of the current global economic downturn which demands that governments improve efficiency in financial resource allocation and utilization (Victor, 2011).

2.1.3 Mathematics Learning in the School

Mathematics is one of the important subjects taught in all schools throughout the world due to its relevance to other subject most especially in the development of science and technology. It is an integral part of life because it is needed by everyone for successful living. Mathematics is an indispensable tool in the study of sciences, humanities and technology. Its usefulness to man activities cannot be overemphasized. Man uses it directly or indirectly in everyday life or activities. It is a human invention, borne out of human in attempt to solve human problems (Kolawole & Oluwatayo, 2005; Adejumo, Oluwole & Muraina, 2015). They also stated that the history of Mathematics reveals that Mathematical concepts such as counting, measuring, fractions, probability and others had their origin in problems faced by the scientists and Mathematicians of the past. Oxford Advanced Learners Dictionary (2000) described Mathematics as the science of numbers and shapes, the process of calculating and using numbers. It can be defined as the science of numbers and shapes. Oyedeji (2000) described Mathematics as creative language, tool and process.

According to Onoshakpokaiye (2006), Mathematics is an expression or graphical representation of what resides in the sub-conscious and also a mental activity. Mathematics is a branch of science that deals with shapes and numbers, Ezenweani (2006) described Mathematics as the branch of knowledge that seeks to improve on human perception of himself and his immediate environment by using clear, logical precise and exact thinking processes. He

also stated that Mathematics is autonomous science that springs up on define basis and develop in any direction based on the unfolding of knowledge. Lappan and Schman (1998), also sees Mathematics as a way of thinking and organizing ones expression. Agwagah (2005) stated that Mathematics involves thinking, modeling, conjecturing and describing all aspects of reasoning about situations. According to Ebenezar (2015), learning can be defined as acquiring a repertoire of cognitive, Meta cognitive structure. It is also linking new information to prior knowledge and it is goal oriented. Bruner cited in Ebenezar (2015) states that learning involves three aspects namely: acquisition of new knowledge; during learning new knowledge is acquired by the learner; transformation which is the process of manipulating or making use of the knowledge acquired to make it fit new task and evaluation. These involve checking whether the way the information was manipulated is adequate to the task. In learning process, there is what individual knows as learning strategies.

Ebenezar (2015) stated that learning is strategic when model learners are aware of and control their efforts to use particular skills and strategies. According to him, awareness refers to knowledge of specific cognitive strategies and how to use the knowledge when they should be used. He also defined control as the capability to monitor and direct the success of the task at hand whether comprehension has failed through predetermined strategies and by checking an obtained answer against estimation. Learning is acquiring new knowledge, behaviour, skills, values, preferences or understanding and may involve synthesizing different types of information (Ebenezar, 2015). Human possessed the ability to learn and this may occur as result of education, personal development or training. It may be goal - oriented and may be aided by motivation. Learning may occur as a result of habituation or as a result of more complex activities. It can also occur consciously or without conscious awareness. Anyamele cited in Ololube (2009) provided a useful framework for the discussing of process of learning.

They defined learning as the transformation of internal representation. Learning is said to have occurred if the mental processes by which one represents reality and internal understandings have been changed in ending ways that are adaptive or advantageous to the individual (Ololube, 2009; Wang & Ye, 2015). They argue that any learning situation involves an interaction of three factors which are task to be accomplished, method of learning it and the learner. Wilson (2001), stated that learning can be accessed from what the students have achieved, the time they spent on the task and the relative efficiency of different treatment.

2.1.4 Mathematics Anxiety

Mathematics anxiety can be defined as feelings of tension and anxiety that interfere with the manipulation of numbers and the solving mathematical problems in an open variety of societal life and academic situations. Mathematics anxiety indicates psychologically a feeling of tension (Richardson & Suinn, 2002) which interferes in learning and performances. In Ailly & Bergering, (1992) it was mentioned as a fear and apprehension. Mathematics anxiety, considered a fear or phobia, produces a negative response specific to the learning, or doing, of mathematical activities that interferes with performance (Whyte, 2009). It is defined as low self confidence, a negative mind-set towards Mathematics learning (Jain & Dowson, 2009; Busari, 2013), feeling threatened (Zohar, 1998), a factor of failing to reach potential (Perry, 2004) and a temporary reduction in working memory (Ashcraft & Kirk, 2001). Tobias and Weissbrod (2000) defined Mathematics anxiety as panic, helplessness, paralysis and mental disorganisation that arises at the time of solving mathematical problems (Fiore, 1999). Tobias (1993) described Mathematics anxiety as a feeling of sudden death. In pursuance of these definitions and considerations by the researchers it can be considered to be a factor, which interferes with the manipulation of numbers and the solving of mathematical problems in academic, and social environments (Suinn, Taylor & Edwards, 2008).

Tobias (1993) defined anxiety in Mathematics as feelings of tension and anxiety that interferes with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situation. According to him, anxiety in Mathematics can cause one to forget and lose one's self confidence. It is very real and it occurs among many students. The question that readily comes to mind then is why students should experience anxiety in Mathematics since Mathematics as opined by Akinsola and Tella (2003) is an important school subject which is associated with more academic and/or career opportunities. Thus, Mathematics anxiety as a psychological construct interferes in developing students' thinking skills it can be considered as a significantly important factor of poor problem solving skills of school students in Mathematics. There are some symptomatic characteristics of Mathematics anxiety helping in identifying children suffering from Mathematics anxiety, which are in the form of physical, psychological and behavioural (Plaisance, 2009; Jackson, 2008): Physical symptoms which includes increased heart rate, clammy hands, upset stomach, light headedness. Psychological symptoms which includes inability to concentrate, feeling of

helplessness, worry, and disgrace and behavioural symptoms which includes avoidance of Mathematics classes, putting off the Mathematics homework until the last minute and irregular study.

Tobias (1993) defined Mathematics anxiety as a tense and anxious feeling which may obstruct one from manipulating numbers and/or solving mathematical problems. Mathematics anxiety has also been defined as the panic, helplessness, paralysis, and mental disorganisation that arise among some people when they are required to solve a mathematical problem and is sometimes referred to as Mathematics phobia or panic (Tobias & Weissbrod, 2000). Spicer (2004) may have summed it up best by stating that Mathematics anxiety is an emotion that blocks a person's reasoning ability when confronted with a mathematical situation. In a meta-analysis of 151 Mathematics anxiety studies involving third grade through postsecondary students, Hembree (2009) concluded that Mathematics anxiety appears to be a learned condition more behavioural than cognitive in nature. Mathematics anxiety does not have a single cause. There are some general factors that have been linked to causing and increasing Mathematics anxiety such as lack of Mathematics preparation, distrust of intuition, and the idea that males perform better than females in Mathematics (Tobias, 1993). Although student readiness may be another factor leading to Mathematics anxiety, the readiness of teachers and the teaching techniques employed seem to be a primary cause (Haralson, 2001). Tobias (1993) wrote that bad experiences with Mathematics teachers can foster Mathematics anxiety and Fiore (1999) stated that teachers and the teaching of Mathematics are known to be the roots of most Mathematics anxiety.

Extensive literature demonstrates that anxiety, stress, lack of confidence, and phobic reactions in the face of mathematical problems are exhibited in most modern cultures (Macrae, 2003), and Mathematics anxiety is commonly characterized by feelings of tension, apprehension, or fear that impacts on mathematical performance (Ashcraft, 2002). It is associated with loss of self-esteem in confronting a mathematical situation (Acelajado, 2004), negative reactions to mathematical concepts and evaluation procedures and with many constructs including working memory, age, gender, self-efficacy, and Mathematics readiness (Cates & Rhymer, 2003). The feeling often in the background that one does not comprehend the meanings, purposes, sources or legitimacy of the mathematical objects one is manipulating and using (Wilensky, 1997) has been identified with statistics anxiety and one might argue similarly

for Mathematics anxiety since comparable sentiments are frequently involved. Anxiety is also indicated as a factor in attrition rates, regardless of actual ability (Jones, 1996), and literature on Mathematics anxiety has typically given support to the existence of a small relationship between Mathematics anxiety and performance (Cates & Rhymer, 2003), with Reyes (2004) reporting a consistent negative relationship between Mathematics anxiety and achievement.

Mathematics is often considered as a difficult subject. Research has shown that many students have learning difficulties and show poor performance in Mathematics. One of the attributed reasons is the anxiety that an individual may have towards Mathematics. There are numerous definitions of Mathematics anxiety. Tobias and Weissbrod (2000), and Fiore (1999) define Mathematics anxiety as the panic, helplessness, paralysis, and mental disorganisation that arises among some people when they are required to solve a mathematical problem. Pradeep (2006) defined Mathematics anxiety is a state of a sinking feeling, uncertainty and despair at doing and understanding Mathematics. There are many causes postulated for Mathematics anxiety. Arem (2003) equates great amounts of Mathematics anxiety with test anxiety, and says it's three- fold: poor test-taking strategies, poor test preparation and psychological pressures. According to Dodd (1999), the lack of confidence is probably the Mathematics-anxious learner's greatest obstacle. Zopp (1999) found that unrelated life events, trigger events in education and a lack of support contributed to Mathematics anxiety. In addition, parents with Mathematics anxiety pass it along to their children, while teachers with Mathematics anxiety pass it along to their students (Fiore 1999).

Feelings about Mathematics as irrelevant may undermine motivation, as it may lead to feeling of anxiety. Mathematics sometimes evokes feelings of dread, fear, and panic that can impede concentration and recall (McLeod, 1992). This phenomenon, referred to as Mathematics anxiety, is a psychological and physiological barrier that results in feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations (Richardson & Suinn, 2002,). Mathematics anxiety is comprised of both cognitive and affective components (Bessant, 1995; Ho, Senturk, Lam, Zimmer, Hong, Okamoto, Chiu, Nakazawa & Wang, 2000). The cognitive component is primarily characterized by worry (Ho et al., 2000) while the affective components include feelings such as fear, nervousness, dread, and dislike for the subject that

may lead to poor performance or avoidance of Mathematics altogether (Betz, 2008; Green, 2000).

Interference and deficit models of Mathematics anxiety have been proposed as explanations for Mathematics anxiety (Ma, 1999). The interference model posits that Mathematics anxiety hinders the recall of information (Tobias, 1993). The deficit model, on the other hand, presumes that the opposite is true: that poor performance, including poor study and test-taking skills, leads to Mathematics anxiety (Tobias, 1993). Based on results of a meta-analysis study, Hembree (2009) concluded that Mathematics anxiety appears to hinder Mathematics performance, supporting an interference rather than deficit model. However, it is generally believed that Mathematics anxiety is more prevalent and intense among students with poor Mathematics backgrounds (Betz, 2008; Godbey, 1997; Hembree, 2009).

Bessant (1995) studied whether various forms of Mathematics anxiety were related to learning strategies and styles. Anxiety over Mathematics in general and Mathematics tests, in particular, was related to reliance on memorization (Bessant, 1995). An achievement strategy approach (that involves note-taking, time management, and reviewing) to learning was unrelated to any measures of Mathematics anxiety; however, a surface approach that relies heavily on memorization was highly correlated with general evaluation anxiety and problem-solving anxiety (Bessant, 1995). A surface motive that involves learning for the mere sake of acquiring credentials (extrinsic motivation) was associated with Mathematics test anxiety and general evaluation anxiety.

2.1.5 Motivational Enhancement Therapy

Motivational enhancement therapy is a therapeutic approach based on the premise that clients will best be able to achieve change when motivation comes from within themselves, rather than being imposed by the therapist. Motivational interviewing, the primary element of MET, was developed by Miller and Rollnick (1991). It is a trans-theoretical model derived from a number of sources; including stages of change theory (Prochaska & Diclemente, 1984), client-centered approaches, and research into what clinician behaviour are associated with the best client gains. Motivational enhancement therapy refers to the process of developing motivating individuals towards achievement in performing a specific task. The goal is to increase their motivation to want to achieve greater things for self or an organisation. This can involve a lot of things such as finding out what makes the individuals tick. In motivational enhancement

therapy, participants are given guidance on how to think, talk and act like a person with high achievement and then examine carefully the extent to which they want to plan their lives in the immediate future (McClelland, 1985).

According to Fader (2010) Motivational enhancement therapy is a technique that was developed by psychologists (Miller and Rollnick, 1991). Motivational enhancement therapy focuses on the provision of accurate, non-judgmental feedback regarding a client's risks and experience of health-related problems, while avoiding labels, confrontation and specific interviewer-generated goals for client behaviour change. In the Motivational enhancement therapy approach, clients are assumed to be in a state of ambivalence that can best be resolved by highlighting discrepancies between perceived risk and actual experience of cognitive consequences. The clinician identifies the difference in where the clients are and where they would like to be. Through careful listening and the reflecting of 'change talk', the clinician provides the client the opportunity to explore a path toward change.

Motivational enhancement therapy (MET) is a brief treatment model designed to help clients who are low in motivation change to help them wakeup to the need to change certain problematic behaviour, those that are health threatening. Motivational enhancement therapy appears consistent with a number of models of health behaviour such as locus of control, Theory of reasoned action, Social cognitive theory, Decisional Balance, Health belief model, Health action process model, self determination theory and self regulatory model. All of these models, despite differences in their terms and emphasis, share three common construct which are the focus of motivational enhancement therapy. These are the patient's expectations about the consequences of engaging in the behaviour, the influence of, or beliefs about, personal control over the behaviour and the social context of the behaviour (Van-Wormer, 2009)

Motivational enhancement therapy may seem simple on the surface, but it is a very sophisticated modality based on advanced research knowledge from social psychology. MET is based on knowledge about how an individual's motivation to change can be enhanced by a practitioner, even when the client is reluctant to make any changes in his or her behaviour (Gance-Cleveland, 2005). Motivational enhancement therapy offers specific reinforcing maneuvers for every step of the way as the client advances, often in a spiraling fashion, toward change. Closely paralleling the strengths perspective in its underlying premises, Motivational enhancement therapy can be viewed as a developmental model in the spirit of the work of Erik

Erikson cited in Gance-Cleveland (2005) and Carol Gilligan (1982). Like theirs, this model is stage-based or sequential. Unlike their formulations, however, MET is geared to direct practice; it is at once a theory and a therapy. Motivational enhancement therapy is defined by Miller (2006) as a person-centered, goal-oriented approach for facilitating change through exploring and resolving ambivalence. This term is most commonly used to represent a series of pragmatic strategies tailored to the client's level of willingness to adjust his or her behaviour (for example, to comply with a medical regimen, reduce criminality, or for smoking cessation (Miller & Rollnick, 2002). These strategies have also been applied with favorable results in batterer intervention programming (Bennett & Stoops, 2007).

McClelland (1985) contends that an individual's thoughts are related to his actions. Articulating a particular motive such as achievement, association or influence has a tendency to increase the frequency of thoughts on that motive. If a particular motive gets more attention in the form of discussion, the network of associations formed in the mind will have the effect of facilitating learning (Elias & Abdul Rahman, 1994). The motivational enhancement therapy laid special emphasis on achievement thinking. According to the motivational enhancement therapy theory, how an individual thinks affects, to a certain extent, his future undertakings. Furthermore, the expectancies and the motives which surface in one's thinking also affect his future propositions and actions. Wolters (2004) in a study investigated how different components of intrinsic motivation were related to each other and to students' motivation, cognitive engagement, and learning gains. Results of these studies imply that it is possible to improve the learning gains of students by enhancing motivational orientations in students.

Miller and Rollnick (2002) are both a treatment philosophy and a set of methods employed to help people increase intrinsic motivation by exploring and resolving ambivalence about behavioural change. In the past decade, MET has become a well-recognized brand and has been used in psychotherapy, medicine, addictions, public health, and beyond. However, clinical popularity does not necessarily equate with evidentiary support. Motivational Enhancement Therapy is a strategy of therapy that involves a variation of Motivational Interviewing to analyze feedback gained from client sessions. The idea of Motivational Interviewing is based on engaging the client to pursue a behaviour change. The method revolves around goal making, with assistance from the counsellor to help guide the client to that specific

set goal. This concept of Motivational interviewing later developed into Motivational Enhancement Therapy.

The goal of this therapy is to help lead the client to achieve the goals they have set for themselves. Its aim is to provide the client with the opportunity to develop a focus in their life, other than their addiction. The therapist works closely with the client to help create an inner willingness to fight their addiction. Unlike other therapy or counseling programs that offer a step-by-step process, MET focuses on creating an internally motivated change. A typical therapy session consists of an initial assessment, and two to four treatment sessions with the therapist. In the initial session, the therapist conducts a discussion about the client's success. They encourage the use of self-motivational statements through Motivational Interviewing. It is in this first session where a plan for change is established between the therapist and client.

Motivational enhancement therapy is based on reaching success and achieving all of people aspirations in life. Achievement goals can affect the way a person performs a task and represent a desire to show competence (Harackiewicz, Barron, Carter, Lehto & Elliot, 1997). Motivational enhancement therapy is described as the need to perform well or the striving for success, and evidenced by persistence and effort in the face of difficulties; it is regarded as a central human motivation. Motivational enhancement therapy as viewed by the cognitive model as the capacity or the ability to think and to construe the causes of success or failure in achievement related tasks.

In an achievement related context, the causes perceived as most responsible for success and failure are ability, effort, task difficulty and luck (Weiner, 2009). David McClelland and John Atkinson were among the first to concentrate on the study of motivational enhancement therapy. They classified motivational enhancement therapy as a variant of motivation that can be distinguished among achievement, power, and social factors (McClelland, 1985). Motivational enhancement therapy was explained by Murray cited in Weiner (2009) as the therapy that make individual to develop desire or tendency to do well or to do better than others. The ability to solve problems, to achieve a high standard of work, the ability to do something unique is examples of achievement motivated behaviour. To be motivated therefore implies a move into action to achieve a perceived goal.

2.1.6 Motivational Enhancement Model

Throughout most of the 20th century, behaviourist theories of motivation dominated the literature. In this perspective, motivations are seen as incentives for performing a given behaviour (Weiner, 2009). Newer reformulations of these theories (McClelland, 1985) have focused on the potential conflict between an individual's perceived necessity for success and perceived necessity for avoiding failure. Although the declining popularity of behavioural research has led to a declining number of studies in this paradigm, this theoretical orientation has provided powerful knowledge about student motivation in Mathematics. First, research indicates that success in Mathematics is a powerful influence on the motivation to achieve. Students perceive success as reinforcing, and they will engage in Mathematics if they expect to be successful. In addition, students will not only engage more, they will also tend to enjoy tasks for which they have a moderately high probability of success more than tasks for which the probability of success is near chance (Dickinson & Butt, 2009). Although success may not be the only determinant of on-task behaviour, it is clearly related to the achievement motivation of children in Mathematics.

Second, and more important, an orientation toward achieving success in Mathematics can be built into the Mathematics classroom. When students are given incentives to achieve, the motivation and achievement of entire classes can be raised. When children are rewarded for choosing a high level of personal success in Mathematics, they tend to enjoy Mathematics more and achieve more than when they are not given incentives. Slavin (2004), for example, recommended the provision of group incentives to motivate students to achieve (that is, providing a group reward for individual learning). Because the group score is rewarded, children are motivated to help others in the group and are pressured to learn well themselves; through this practice, individual accountability is emphasized. This practice allows students to attribute their successes to themselves and their failures to the group, thus reducing the individual's onus for failure proportionately to the number of students in the group.

Severe limitations are, however, evident in this paradigm, which depends on achievement measures that use either multiple-choice tests or well-defined problems. It is unclear how more realistic problems, ones that provide more avenues for failure, would affect the success rate of children. Also unclear is whether success should be defined as success with a problem as a whole or in the steps necessary to solve the problem. The operational definition of

success inherent in behaviourist research, with a focus on discrete observable behaviour, may be too molecular in scope or too removed from children's readiness to be a valid index of their achievement motivation. Time-on-task is often used as an index of motivation (Dickinson & Butt, 1989). Reliance on time-on-task, however, introduces a confounding variable into the research design: The difficulty level of a problem is related to the time required to solve the problem, independent of motivation.

In addition, because behaviourist theories have not traditionally been concerned with individual differences, they fail to provide information on how students define success and failure in Mathematics. The most compelling argument against the use of incentives or coercion, however, is the hidden costs of reward, well described by Lepper and Greene cited in Cameron and Pierce (1996). Engaging in an intrinsically motivating activity under conditions that make obvious the fact that the activity is merely a means to an end will diminish subsequent intrinsic motivation because the presence of the reward is the primary reason for the student to engage. Consequently, in the absence of the reward students become less likely to engage in similar tasks in the future. The most salient (and most misrepresented) feature of this line of research is not that rewards necessarily undermine intrinsic motivation but that the expectation of tangible task-contingent rewards tends to weaken the intrinsic desire to learn. When rewards are not expected, intrinsic interest does not seem to be affected adversely nor do non-contingent rewards seem to have any real effect on subsequent intrinsic motivation (Lepper, Greene, & Nisbett, 2003).

Lepper, Keavney, and Drake (1996) even suggested that judicious application of reward contingencies can be beneficial for developing sufficient skill in a pursuit so that intrinsic motivation can develop. Although this longstanding principle has recently been contested (Cameron & Pierce, 1996), a plethora of research suggests that when rewards are used to get someone to engage in some activity, the probability of subsequent disillusionment with the activity increases significantly (Kohn, 1996; Ryan & Deci, 1996).

Researchers in the 1960s and early 1970s, when they began to examine individuals' perceived reasons for their successes and failures, found that success is not a universal motivator. Much of an individual's intention to initiate behaviour depends on the value that the consequences of success have for him or her (Lepper, Greene & Nisbett, 2003). Researchers began to focus attention on what factors students perceive to be the causes of their successes

and failures. Attribution theories deal with how the gains of an activity are evaluated in relation to the individual's perception of his or her own contribution (ability and effort) and the contribution of the task demands (difficulty, consistency, precedent).

In Mathematics education, attribution theory is the most widely held of the theoretical orientations discussed in this article, perhaps because (a) attribution theories are cognitive, describing the processes by which motivations are acquired and changed and (b) they are applicable to a remarkable range of domains. Moreover, attribution theories provide a middle ground between competing models of motivation such that findings can be discussed in terms of reinforcers and contingencies or in terms of students' thoughts, plans, and goals. Students in the lower elementary grades are generally highly motivated to learn Mathematics. They believe that they are competent and that working hard will enable them to succeed. Many first and second graders do not distinguish between effort and ability as causes of success in Mathematics (Kloosterman, 1993).

Goal theorists delve more deeply into the cognitive bases of the reasons people do what they do. They are concerned with understanding how people think about engaging in meaningful (or meaningless) activity, and they also conduct research on people's perceptions, interpretations of academic and social information, and patterns of self-regulation (Ames & Ames, 2004). Moreover, researchers who ground their work in goal theory often incorporate the generalized findings from the attribution literature and attempt to posit how reasons for success and failure are related to what is valued (Ames & Archer, 2008; Dweck & Leggett, 2008).

Duda and Nicholls (1992) suggested that the basic dimensions of goal orientations correspond directly to distinct implicit theories (or beliefs) of how success is achieved in academic work. An individual with a mastery (or learning goal) orientation values the improvement of skill or knowledge in a given domain and believes that success depends on working hard, attempting to understand the domain, and collaborating with others. An individual with an ego (or performance goal) orientation values establishing superiority over others (Duda & Nicholls, 1992) and believes that success depends on social comparison and assertion of superior ability. A third orientation, work avoidance, is an especially disturbing goal pattern in which working hard is not valued. An individual with this goal orientation believes success results from, for example, "behaving nicely in class" or other behaviour superfluous to study and academic thoughtfulness. Work avoidance is often developed as a

coping method for preserving feelings of adequacy by eliminating any threatening or difficult activities so that a legitimate negative evaluation of one's ability cannot be made by others.

2.1.7 Historical Background of Motivational Enhancement Therapy

The concept of Motivational enhancement therapy was first described by Miller (1983) in the literature and elaborated by Miller and Rollnick (1991). Miller (2006) credited the formulation of MET to the relentless and spirited questioning by his student as he demonstrated how he would work with clients in various settings. The kind of questioning that ensued was "Why have you taken this approach rather than another?", this according to Miller, required him to "make explicit the approach I had learned from my clients" The result was a beginning conceptual model that was followed by years of testing and refinements, which culminated in the groundbreaking text *Motivational Interviewing therapy: Preparing People to Change Addictive Behaviour* (Miller, 1991). With characteristic modesty, Miller and Rollnick later stated that there is little that is highly original in motivation enhancement. For their inspiration, Miller and Rollnick credit the theoretical contributions of Carl Rogers and his students who developed the principles on which client-centered psychotherapy was based. The development of motivational theory took a major leap forward when it absorbed the notion that behaviour change occurs in increments or stages and that it involves specific tasks related to the degree of an individual's willingness to change (Diclemente & Velasquez, 2002).

The impetus for theoretical advance came with the publication of the research on smoking cessation conducted by Prochaska and Diclemente (1982). Called the Trans theoretical model, because it was interdisciplinary, the stages-of-change approach revealed the thinking patterns of smokers who eventually were able to quit. Their thinking was found to progress from pre-contemplation, before they were ready to change, to contemplation to quit, to preparation for action, to action, to maintenance, to possible relapse, and so on. Specific interventions have now been spelt out to match the client's stage of readiness to move from a refusal to cooperate to a decision to work on his or her problems.

Two developments in the United States promoted the advocacy of motivational enhancement therapy. The first was cross-fertilization of knowledge through international conferences on substance misuse. Through such exchanges, American social scientists began to grow familiar with principles of motivation and teach these concepts to their students. A second major development came with one of the most massive and best-publicized research

experiments in substance abuse treatment history called matching alcoholism treatment to client heterogeneity. Motivational enhancement therapy is based on four primary principles designed to avoid the persuasion dilemma that occurs when action-oriented providers encounter Clients in the contemplation stage of change (Miller and Rollnick, 1991). The three principles of MET are: 1) Express empathy, 2) Develop discrepancy and 3) Roll with resistance. By employing these principles, MET represents a focused response to ambivalence in the crucial stages of contemplation and determination and may also be useful if ambivalence recurs further along in the change process. By relating to the client in a way that is both respectful and empathic, the provider facilitates an environment of mutual trust.

By adopting a collaborative, stage-sensitive style, the provider is less likely to elicit resistance from the client and more likely to stimulate open, honest communication. More importantly, variations within client gender, ethnicity, and socioeconomic status do not appear to affect (or predict) gains in studies of MET (Brown & Miller, 1993; Smith, Heckemeyer, Kratt & Mason, 1997), indicating that MET can be utilized as an appropriate clinical intervention for most Clients.

2.1.8 Principles of Motivational Enhancement Therapy

There are two general explanations for the source of motivational enhancement therapy (Stipek, 1993). A school of thought sees motivational enhancement therapy as a stable and unconscious trait- something that individual has more or less of. This explanation ascribed the source of motivational enhancement therapy to the family and cultural group of the student. The explanation assume that if achievement, initiative and competitiveness are encouraged and reinforced in the home, and if parents let children solve mathematical problems on their own without becoming irritated by the children's initial failures, children are more likely to develop a high need for achievement (McClelland & Pilon, 1983; Woolfolk, 1995). Children who see that their actions can have an impact on their environment and who are taught how to recognize a good performance are more likely to grow up with the desire to excel (Lefton, 1994; Schunk, 1991). The second explanation for motivational enhancement therapy liken it as a set of conscious beliefs and values shaped mainly by recent experiences with success and failure and by factors in the immediate situation such as the difficulty of the task or the incentives available.

Motivational researchers have sought to promote a hierarchical model of approach and avoidance motivational enhancement therapy by incorporating the two prominent theories: the achievement motive approach and the achievement goal approach. Achievement motives according to Atkinson cited in Lepper, Greene and Nisbett (2003); Grote and James (1991) include the need for achievement (striving) and the fear of failure (apprehensiveness). These are the more predominant motives that direct our behaviour toward positive and negative gains. Achievement motives can be seen as direct predictors of achievement-relevant circumstances. Thus, achievement motives are said to have an indirect or distal influence, and achievement goals are said to have a direct or proximal influence on achievement-relevant gains (Elliot & McGregor, 1999). People motives for achievement can range from biological needs to satisfying creative desires or realizing success in competitive ventures. Two motives are directly involved and often work together in the prediction of individual's behaviour in direction and passion, implicit and explicit (Brunstein & Maier, 2005). Implicit motives are spontaneous impulses to act, also known as task performances, and are aroused through incentives inherent to the task. Individuals with strong implicit needs to achieve goals set higher internal standards, whereas others tend to adhere to the societal norms.

The following are the guidelines which a Therapist follows in carrying out Motivational enhancement therapy:

Expressing Empathy

Motivational enhancement therapy is based heavily on the client-centered work of Carl Rogers (1957, 1961). In his approach, Rogers focused on the client's awareness of their own thoughts and abilities in an effort to increase confidence in, and reliance on, their own decision-making skills. For Rogers, the client was the expert on how to make changes for himself or herself and he facilitated this process through the use of three primary therapist "qualities" that included acceptance, positive regard, and genuineness-in essence, the core of empathic responding. The fact that numerous studies have found therapist empathy to be one of the most reliable predictors of outcome speaks to the importance of Rogers' work and highlights the existence of one of the most reliable of all common factors in psychotherapy (Beutler, Machado, & Neufeldt, 1994; Lafferty, Beutler & Crago, 1989).

Within the context of MET, empathy carries a very specific meaning. Rather than feeling sympathy, relating to similar experiences, or even agreeing with Clients, empathy is

defined as "The ability of the provider to accurately reflect what the client is saying (Moyers, 2000). Truly empathic responding therefore requires that clinicians employ active listening skills.

Developing Discrepancy

The second principle component of MET is that of developing discrepancy. The process of developing discrepancies between achievement and other more valued aspects of one's life is intimately related to the Client's values and belief systems. Specifically, the goal is to elicit from the individual those aspects of his or her life that are important and at odds with current behavioural patterns. For example, a Client may state that he really looks forward to learn with his friends several nights a week to relieve anxiety.

However, in an earlier statement he also revealed how much he enjoys reading to his children at bedtime. In a situation like this, the therapist might offer what is called a double-sided reflection such as, "On the one hand you really look forward to blowing off steam with your friends at the bar, and spending that time with your kids each night seems really important to you as well." In developing discrepancy, it is important for the treatment provider to gain a deep understanding of what really matters to the Client both in terms of immediate and long term life goals. Additionally, understanding value systems is also important. Once the Provider has an adequate understanding of these areas; he or she will be better equipped to assist the ambivalent Client with the process of clarifying important goals that can play a critical role in sound decision-making.

Rolling with Resistance

Rather than meeting Clients resistance with confrontation, Therapists are encouraged to utilize reflection in an effort to decrease it whenever possible. For example, when describing her learning habit a Client might report, "he didn't know why he complains so much, all he has is F9 in all subjects in the school." To which the therapist might respond, "For you, having F9 isn't a big deal." Additionally, it is often the case that many Clients are remanded to treatment for one reason or another. In such a case, a Client might come right out and say, "I don't need to be here and I'm not happy about being forced to come." The MET therapist might respond that "he hears loud and clear, people not happy about being here and this seems like a waste of their time."

In rolling with resistance, it is often necessary to hear Client express frustrations and even to make ridiculous statements without confronting them directly. Such a style implies that the treatment provider be flexible and willing to "lose the point" in disputes. The interviewer recognizes that resistance typically points out substantial energy that may be harnessed in an effort to explore the reasons for ambivalence. When clients are resistant, angry, or otherwise needing to make a point, rolling with these episodes increases the likelihood that the Client will remain engaged and potentially more receptive to those aspects of the treatment process that they may, indeed, find helpful. In any case, the choice of what to take and what to leave is always theirs to make.

2.1.9 Self-Monitoring Skill Training

Self-monitoring is a two-stage process that involves observing and recording. The student needs to determine if the target behaviour did or did not occur. Then, the student self-records some feature of the target behaviour (Mace, Belfiore, & Huchinson, 2001). He or she can either record the number of occurrences of a target behaviour to be decreased (e.g., getting out of one's seat) or to be increased (e.g., time on task). Then the student and teacher together determine an acceptable number of occurrences and reinforcement for obtaining the agreed upon number. Sometimes the simple act of recording increases awareness enough to modify the behaviour; in other cases, the reinforcer is critical in reducing or increasing the occurrence of behaviour. Self-monitoring moves beyond the recording of a behaviour to the evaluation of performance. Self-monitoring involves a student comparing his or her performance relative to a set criterion (e.g., completing 10 word problems with at least 90% accuracy). The criteria can be established by the teacher, the student, or in a collaborative fashion. Then, the student receives some form of reinforcement (e.g., a small break or a positive behaviour support ticket) if he or she meets the criteria. For example, a student might review a homework assignment by looking for items such as name, date, and completeness and then decide whether he or she had done acceptable work. Self-monitoring is similar to self-monitoring in that both strategies require students to self assess behaviour and record their performance within specified intervals. Also, it should be noted that there are different types of self-monitoring: teacher mediated and peer mediated, with both being quite successful (DuPaul, McGoey & Yugar, 1997).

Self-monitoring is a self-management procedure whereby a person systematically observes his or her own behaviour and then records the occurrence or non-occurrence of a target

behaviour (Ganz, 2008). It can include an evaluation component where the student actively obtains feedback and records progress towards a standard (Cooper, Heron & Heward, 2007). The procedures for self-monitoring are most effective when they are simple, efficient and acceptable to the student, minimally obtrusive or laborious and relevant to the student's needs and goals. Self-monitoring can be a valuable component of an intervention package that might also include consequence-based contingencies such as reinforcement. Self-monitoring is important as a student-directed strategy that can promote independence, motivation, engagement, self-reliance and self-determination to increase learning.

Self-monitoring is practical since it encourages more self-regulation and less teacher-directed support for behaviour that interfere with learning. A potential classroom benefit of using a self-monitoring procedure is that teachers can spend more time on instruction and less time managing students' off-task and inappropriate behaviour (Ganz & Sigafos, 2005). Self-monitoring interventions have been used in a variety of settings including resource, inclusion and general education classrooms for students with and without disabilities (Hughes & Boyle, 1991; Hughes et al., 2002) and have shown positive gains for students with a wide variety of disabilities, such as learning disabilities, speech and language impairments, mild-to-moderate intellectual disabilities, emotional and/or behavioural disorders and attention-deficit hyperactivity disorder (ADHD) (Reid, Trout & Schartz, 2005; Webber, Scheuermann, McCall & Coleman, 1993). In addition, self-monitoring has been studied across a variety of diverse behaviour. For instance, it has been shown to be an effective intervention to address a wide range of adaptive behavioural deficits including distractibility, impulsivity, non-compliance and aggression (Levendoski & Cartledge, 2000), as well as for organisational and academic problems with classroom preparedness (Gureasko-Moore, DuPaul & White, 2007; Gureasko-Moore, DuPaul & White, 2007), engagement, task completion and academic performance (Rock, 2005; Rock & Thead, 2007).

O'Malley and Chamot (1990) define self-monitoring as checking one's comprehension during listening or reading, or checking the accuracy and/or appropriateness of one's oral or written production while it is taking place and contrast this with self-evaluation, which is checking the gains of one's own language learning against a standard after the learning has been completed. Wenden (1991) offers similar definitions that differentiate self-monitoring and self-evaluation based on the time elapsed between production and assessment. This time period,

however, does not change the nature of the evaluation process. Evaluation occurs both during and after learning. Metacognitive trainings are considered a unitary construct referred to as self-monitoring and defined as conscious observation and evaluation, which is usually recorded, of one's own performance or behaviour on a learning task. The proposition that self-monitoring enhances learning has been widely discussed in general education as well as science education. Self-monitoring has been investigated in relation to many aspects of learning, with behaviour modification receiving the most attention.

Self-monitoring refers to a complex of acquire the intentional skills involved in controlling, directing and planning one's cognitions, emotions, and behaviour (Schunk & Zimmerman, 1998). In investigations beyond the classroom, scientists from a broad range of perspectives have converged on the centrality of successful self-monitoring learning as a marker of adaptive development. Findings demonstrate, at an emerging level of specificity, how biological and neurological processes interact with psychological and experiential factors to determine how children monitor themselves in a given setting. Biological factors such as temperament, or an individual's predisposed reactivity and regulation of reactions to stimuli, underpin these additive and interactive processes. Self-monitoring learning also develops through early experiences and social interactions, where caregivers and other significant individuals structure and shape children's trajectories.

Multiple underlying cognitive skills are involved in overt behavioural monitoring. This complex of cognitive processes involves processing and manipulating stimuli (working memory); inhibiting automatic reactions to stimuli while initiating unnatural yet adaptive reactions (inhibitory control); and managing one's attention to appropriate stimuli, including resisting distraction and shifting tasks when necessary (attentional or cognitive flexibility). Evidence has linked these individual cognitive components to achievement prior to formal schooling (Blair & Razza, 2007; McClelland, Cameron & Connor, 2007) and throughout elementary school (McClelland, Acock, & Morrison, 2006). For example, the Early Child Care Research Network found that better attention on a tedious computer task predicted better reading and Mathematics achievement in 54-month-old children. In another study, kindergarteners with better attention scored significantly higher than those with poorer attention skills on achievement tests (Lange, 2003).

A third study of working memory showed that children who could keep better track of the number of dots on multiple cards had higher Mathematics achievement. Blair and Razza (2007) found that preschool levels of inhibitory control predicted kindergarten reading and Mathematics achievement. These studies demonstrate that performing well on tasks requiring focused, vigilant attention; remembering multiple pieces of information; and inhibiting automatic actions to activate non-automatic responses predict higher levels of early achievement. Self-monitoring learning skills require that students' goals be realistic challenging but attainable. With realistic goals, students can monitor progress and decide on a different task approach if their present one is ineffective. Self-monitoring is increased as students note progress, attain goals, and set new challenges.

Goals set too high or too low do not enhance self-monitoring learning or achievement beliefs. Students perceive little progress toward lofty goals, which lowers self-efficacy and leads them to work halfheartedly and give up readily when they encounter difficulty. Easy goals do not produce high self-efficacy because they do not inform students about what they are capable of doing. In the context of an individualized, Mathematics instructional program, Sagotsky, Patterson, and Lepper cited in Akinsola and Animasahun (2007) found that self-monitoring of progress enhances time spent working on materials and number of problems solved, whereas setting session goals offers no advantages.

Children may have had difficulty setting realistic goals because problem difficulty varied within and between units. Goal setting is appropriate only when task difficulty remains relatively constant. There is rich, historical literature addressing factors that influence goal setting and self-monitoring learning training. Lewin, Dembo, Festinger, and Sears cited in Lepper, Greene, & Nisbett (2003) explored the construct level of aspiration, or goal-setting behaviour within a range of difficulty. Various factors influenced the level of aspiration: prior successes and failures, group standards, upper and lower goal limits, and expectations for success and failure. Self-monitoring learning training also focused on goal setting; Charms (2006) worked with teachers, who trained students to take personal responsibility for their learning gains. Self-monitoring learning was an important training component; in one activity, students chose easy, moderate, or difficult words to learn to spell. Self-monitored learners proactively generate and implement strategic plans to attain self-set goals. They also frequently monitor and evaluate their goal progress and seek feedback to facilitate strategic adjustments to

further optimize their achievement and adaptive functioning (Zimmerman, 2000). Research has shown that when individuals maintain a strong sense of self-efficacy and possess the requisite skills to effectively monitor their lives they have a much greater chance of reaching their academic potential.

2.1.10 Theory of Metacognition

Metacognition was first conceptualized by Flavell (1979) to add a new dimension in the field of psychology and open a new horizon for extended theoretical and empirical studies on thinking, memorization, understanding and learning skills. Flavell originally coined the term metacognition in the late 1970s to mean cognition about cognitive phenomena or more simply thinking about thinking (Flavell, 1979). Subsequent development and use of the term have remained relatively faithful to this original meaning. For example, researchers working in the field of cognitive psychology have offered the following definitions: the knowledge and control children have over their own thinking and learning activities (Cross & Paris, 2008).

Awareness of one's own thinking, awareness of the content of one's conceptions, an active monitoring of one's cognitive processes, an attempt to regulate one's cognitive processes in relationship to further learning, and an application of a set of heuristics as an effective device for helping people organize their methods of attack on problems in general. It is awareness and management of one's own thought (Kuhn & Dean, 2004). The monitoring and control of thought (Martinez, 2006). As Kuhn and Dean (2004) explain that metacognition is what enables a student who has been taught a particular strategy in a particular problem context to retrieve and deploy that strategy in a similar but new context. The authors note that in cognitive psychology, metacognition is often defined as a form of executive control involving monitoring and self-regulation, a point echoed by other researchers.

The concept of metacognition was used in a lot of research studies to refer to knowing about knowledge, thinking about the thinking process and knowing and awareness about consciousness. This expanded conception includes a number of sub-concepts such as: metamemory, metacomprehension, metalanguage, metaperception and metacognition (Nelson, 1992; Reader, 1996). Researchers view metacognition as self-monitoring or the conscious use of learning strategies (Borkowski, 2007). Bruer (1995) defined this as the individual's ability to think about the thinking minutes. Sternberg (1985) view it as the high-level control over the individual's cognitive performance, which includes high level planning, monitoring, control and

evaluation. As shown by Sternberg (1985), metacognitive thinking exceeds the limits of cognitive thinking; hence, it represents the mental activity in its highest level, when a student remains completely aware of him/her self when he/she is thinking in a certain task.

After the completion of learning task evaluation and reflection come into focus. Metacognitive knowledge refers to the knowledge of learners about their own cognition, cognitive functioning, and possibly that of others. This knowledge is enlarged by reflection on learning experiences and can be used in the planning of further learning tasks. Because metacognition does not develop automatically in all students, teachers play an essential part in its development. Some authors suggest that especially low achievers need specific teacher support while high achievers develop metacognitive skill more easily without any teacher interference. In the absence of teacher support, high achievers will take more advantage of the education offered to them and extend their lead (Bolhuis, 2000; Mayer, 2001). It seems evident that teachers at least should teach students how to regulate their learning processes before they hand over responsibilities for learning to them and for obvious reasons this is especially important for students who do not have metacognition at their disposal without any help.

Apparently, more theoretical work needs to be done for attaining a unified definition of metacognition and its components (Winne, 1996). Nelson (1996) gave an initial impetus to such a unified theory. Basically, he distinguished an object-level at which level cognitive activity takes place, from a meta-level which governs the object-level. Two general flows of information between both levels are postulated. Information about the state of the object-level is conveyed to the meta-level through monitoring processes, while instructions from the meta-level are transmitted to the object-level through control processes. Thus, if errors occur on the object-level, monitoring processes will give notice of it to the meta-level and control processes will be activated to resolve the problem. This seems an elegant and simple model, including both metacognitive knowledge and skills. However, research based on Nelson's theory has been limited primarily to metamemory and the phenomena of Feeling-of-Knowing and Judgment-of-Learning.

Metacognition means learners' knowing or being aware of their own cognitive processes, and controlling and directing these processes. Gallagher (1997) defines metacognition as thinking about thinking, Doganay (1997) describes it as a thinking process that takes place in every stage of learning and that reflects students' behaviour. Davis and Davis

(2001) point out that learners' awareness of their own thinking, using this awareness in controlling the things they do, using thinking processes such as memory, attention and imagination, and using learning to learn skills indicate that metacognition is interrelated with all thinking dimensions. On the other hand, the related literature encompasses several studies that investigate problem solving and metacognitive skills together (Marge, 2001; Teong, 2002). Besides, various studies on metacognition (Schraw, 2009; Teong, 2002; Victor, 2004) found that metacognition had a prominent role in the education of children and adults. Besides, some other studies (Cautinho, 2007; Deseote & Roeyers, 2002) detected a significant relationship between the level of metacognitive skills and the level of academic success, and success in problem solving skills is related to the knowledge of metacognition (Hollingworth & McLoughlin, 2001). Recently, metacognition as a self-regulated learning way has been viewed as a research field that has prominent effects on the learners' academic success and performance.

Learning is a thinking process. Therefore, it becomes more permanent with the increase in thinking processes involved. In such process, studying is defined as the effective use of certain techniques for learning purposes (Yıldırım, Doganay, & Turkoglu, 2000). In order to be able to plan, process and evaluate their own learning processes, learners need to gain the skills such as planning, effective reading, listening and writing, and active participation. Studies show that having studying skills has positive effects on the academic success and self-esteem (Gall, Gall, Jacobsen, & Bullock, 1990). The process of studying is actually a process of problem solving. In such process, learners' planning, organizing, and evaluating the things they are going to do will inform them about the way to follow, and this will affect their performance in a positive way. Paris and Winograd (1990) state that metacognition is a way of enhancing problem solving through cognitive tools. Problem solving involves higher order thinking processes such as understanding, analyzing, synthesizing, generalization, and learning to think for themselves, which requires an integrated association. Doganay (1997) defines metacognition as the awareness of mental processes and strategies and the ability of evaluating and reflecting on the intellectual productions. He also points out that metacognition is involved in every phase of the problem solving process.

Cross and Paris (2008) discerned three kinds of metacognitive knowledge: declarative knowledge (knowing what factors influence human cognition), procedural knowledge (knowing

how certain skills work and how they should be applied), and conditional knowledge (knowing when strategies are needed). Flavell (1979) already made a distinction between metacognitive knowledge, experiences and metacognitive skills. Metacognitive knowledge refers to declarative knowledge about what and how factors act and interact to affect learning processes. Metacognitive experiences have to do with where one stands in a specific process and what progress one is making. These experiences may activate self-monitoring skill training that monitor cognitive processes. Metacognitive skills are part of procedural knowledge. Vermunt (1992) refers to them as activities students undertake to regulate, monitor and control their own cognitive processes. They comprise the application of cognitive and environmental resources as demanded by the task (Newman, 1998).

Baker and Brown (1984) identified three components of successful cognitive skills training that include (1) skills training, (2) self-control training, and (3) awareness training that continue to draw attention in recent studies. The following are components of Metacognition as stated by Flavell (1979):

1. Metacognition Knowledge: This refers to the individual's knowledge of facts about the cognitive processes and how to control these processes (Flavell, 1979). This in turn can be divided into:

a) Learner-related knowledge: This is the individual's awareness of his/her abilities and mental level; and his/her ability to evaluate his/her mental operations and details of his/her thinking processes.

b) Task-related knowledge: This is the individual's awareness that each mission needs a special mental ability. Thus, tasks classified of a certain dimension are easier to recall than unclassified ones. For example, tasks of memorization nature need lower mental ability than analytical and evaluative tasks, which need higher level of mental processes.

c) Strategy-related knowledge: This refers to memorization aids used by the learner, such as recurring, organisation, expansion, linking previous knowledge with the new knowledge (Pintrich, 2002).

2. Metacognition Regulation: This refers to the different strategies a student uses interacting with a certain teaching situation. Examples of such strategies are: planning, monitoring, controlling, examining, error correction and reviewing (Narens, 1990). Metacognitive

instructional strategies are considered of high significance, since it supports attaining effective learning through developing the students' thinking ability.

2.1.11 General versus Domain-Specificity of Metacognition

An issue of particular importance to educators is whether metacognition is general by nature, or rather task and domain specific. General metacognition may be instructed concurrently in different learning situations and may be expected to transfer to new ones, whereas specific metacognition has to be taught for each task or domain separately. Much research on metacognition only pertains to one specific task or domain, such as reading and text studying (Leutner & Leopold, 2000; Veenman & Beishuizen, 2004; Zhang, 2001), writing, Mathematics problem solving (Desoete & Roeyers, 2003; Kramarski & Mevarech, 2003), science classes (Thomas, 2003), and economy lessons (Masui & De Corte, 1999). Although these studies provide detailed information of how metacognition operates in specific tasks and domains. So far, studies with multiple tasks or domains yielded inconclusive results. Research by Schraw, Dunkle, Bendixen & Roedel (1995) and Schraw & Nietfeld (1998) revealed that monitoring skills are general by nature, whereas Kelemen, Frost and Weaver (2000) provided evidence against such a general skill. In the same vein, Glaser, Schauble, Raghavan and Zeitz (1992) observed many differences in metacognitive activity between different tasks, whereas Veenman, Elshout & Meijer (1997) and Veenman & Verheij (2003) obtained strong support for the generality of metacognitive skills.

One of the reasons for these equivocal results may be found in the grain of analysis used by researchers. At first glance, metacognitive activities may differ from one task to the other, say text studying vs. problem solving. Orienting activities for text studying include reading the title and subheadings, scanning the text to get an overview, activating prior knowledge, and getting hold of test expectations. Orientation during problem solving, on the other hand, encompasses reading the problem statement, activating prior knowledge, and establishing what is given and what is asked for. Although specific overt activities are evoked by different learning tasks, these divergent activities may spring from similar metacognitive grounds and their occurrence and quality may still be correlated across tasks and domains.

From the literature on metacognition development (Flavell & Wellman, 1977; Kuhn, 1999), the following picture emerges. Theory of Mind develops somewhere between the age of 3 to 5 years (Flavell, 2004; Lockl & Schneider, 2007). In the years thereafter, metamemory and

metacognitive knowledge develop, but continue to do so during life span (Alexander, Carr & Schwanenflugel, 1995). Metacognitive skills emerge at the age of 8 to 10 years, and expand during the years thereafter (Berk, 2003; Veenman & Spaans, 2005). Moreover, certain metacognitive skills, such as monitoring and evaluation, appear to mature later on than others (e.g., planning). Research by Whitebread (1999) however, has shown that the behaviour of very young children (5 year olds) may reveal elementary forms of orientation, planning and reflection if the task is appropriated to their interests and level of understanding. This means that our model of metacognitive development needs some revision. Most likely, metacognitive knowledge and skills already develop during preschool or early-school years at a very basic level, but become more sophisticated and academically oriented whenever formal educational requires the explicit utilization of a metacognitive repertoire.

Alexander (1995) showed that metacognitive knowledge develops along a monotonic incremental line throughout the school years, parallel to the development of intellectual ability of students. The impact of intelligence neither increases, nor diminishes over the years. Similarly, Veenman et al. (2004) obtained similar results for the development of metacognitive skills in relation to intellectual ability. In other word, intelligence only gives students a head start in metacognition, but it does not further affect its developmental course. It seems that metacognitive skills initially develop in separate domains, and later on become generalized across domains (Veenman & Spaans, 2005). The researchers need to determine the processes that are responsible for this transfer across domains along the developmental trajectory. These processes include, amongst others, high road transfer and linking metacognition through instruction and feedback provided by teachers. Additionally, examination of the connection of metacognitive development in formal educational settings and other settings is needed.

2.1.12 Self-Monitoring Skill Model

Over the past two decades, researchers have struggled with the conceptualization and operationalisation of self-monitoring capacity, coming to the conclusion that there is no simple and straightforward definition of the construct of self-monitoring. The system of self-monitoring comprises a complex, super-ordinate set of functions (Carver & Scheier, 1990) located at the junction of several fields of psychological research, including research on cognition, problem solving, decision making, metacognition, conceptual change, motivation, and volition. Each of these research domains has its own paradigms and traditions. Also, each

research community focuses on different content and aspects of the self-monitoring process, addressing different components and levels of the construct. Scanning the most recent literature in educational psychology reveals several evolving models of classroom self-monitoring (Corno, 2001; Pintrich, 2000; Schunk & Zimmerman, 1998).

Comparing the major self-monitoring models in education, Pintrich (2000) came to the conclusion that each model emphasises slightly different aspects of self-monitoring. Corno, for example, emphasises volitional aspects of self-monitoring, whereas Winne emphasizes the cognitive aspects of self-monitoring, and McCaslin and Hickey (2012) emphasise the socio-cultural aspects of self-monitoring. Nevertheless, all of the models share some basic assumptions. All theorists assume that students who self-monitored their learning engaged actively and constructively in a process of meaning generation and that they adapt their thoughts, feelings, and actions as needed to affect their learning and motivation. Similarly, models assume that biological, developmental, contextual, and individual difference constraints may all interfere with or support efforts at monitoring. Theorists are in agreement that students have the capability to make use of standards to direct their learning, to set their own goals and sub-goals. Virtually, all theorists assume that there are no direct linkages between achievement and personal or contextual characteristics; achievement effects are mediated by the self-monitoring activities that students engage to reach learning and performance goals.

Over the years, theorists in educational psychology always narrow the scope of students' capability to self-monitor through a focus on the academic side of education, namely on learning and achievement goals. Deliberate restriction of the scope of self-monitoring to the construct of self-monitoring highlights both the strengths and weaknesses of the self-monitoring models that have been developed in educational psychology. A clear focus on learning goals suggests that the literature on learning processes in various content domains (that is how students learn to read, write, and reason about problems) has to be foundational for model development. Equally foundation is the distinction between cognitive and metacognitive functions and subsequent domain-specific extensions of this mode (Hadwin & Winne, 1998). As Flavell (1979) explained, metacognition (cognition about cognition) refers to two aspects, namely the students' self-awareness of a knowledge base in which information is stored about how, when, and where to use various cognitive strategies and their self-awareness of and access to strategies that direct learning such as monitoring difficulty level, a feeling of knowing.

Limiting the range of goals that students pursue in the context of classrooms to learning and achievement goals has allowed researchers to accrue a detailed understanding of the cognitive and affective processes that underlie actions that students initiate to regulate their motivation and learning in the classroom. By describing the self-monitoring strategies that learners use to reach academic goals, the self-monitoring learning perspective sheds light on how students form and maintain learning intentions but discloses little about students' actions and efforts at monitoring when they are not so mindfully engaged in learning (Busari, 2013).

One criticism of self-monitoring learning models is that the deliberate focus on mindful learning and biases knowledge about how students with diverging work habits and regulation styles manage the biological, developmental, contextual, and individual difference constraints that threaten their efforts at self-monitoring learning. This focus has shed little light on students who do not fit the pattern of a self-monitoring learner. Another weakness is that this approach ignores interactions between achievement goals and other goals that students pursue in classrooms such as belonging, social support, safety, entertainment, and self-determination goals (Boekaerts, 2005).

2.1.13 Kohler's Theory of Learning

One of the most famous examples of human insight was that of chemist Frederick Kekule in 1865. Kekule cited in Oladele (2009) had been trying to devise an overall theory of the structure of organic molecules. One afternoon, he was dozing before his fire and had a dream in which 'atoms gamboled' before his eyes, forming 'long rows, sometimes more closely fitted together; all turning and twisting in snake like motion'. As the dream continued, Kekule noted that one of the snakes had seized hold of its own tail, and the form whirled mockingly before his eyes. As if by a flash of lightning, he awoke (Rothenberg, 2009). In the vision of the snake biting its own tail, Kekule saw that important organic and compounds consist of closed rings of atoms. He had made a discovery fundamental to the understanding of organic chemistry. The word 'gestalt' means a configuration, shape, or form. The Gestaltists such as Wertheimer, Koffka, Kohler, Lamin, Combs and Snygg cited in Alhassan (2000) reject learning as the formation of a bond between stimulus and response. They believe that learning occurs by insight: there is a sudden re-organisation of the person's field and he understands. These psychologists argue that since all events in nature occur within some field, it is the totality of the field, its properties and structure that explains all events happening within the field. It is

important for you to note that of all the experiments conducted by the Gestaltists, Kohler's seems most instructive and he is a basic reference in Gestaltists psychology.

Kohler's approach considers man's inner processes as a 'whole' instead of seeing them as tiny pieces like those of jigsaw puzzle. In addition, Kohler and his fellow Gestaltists assume that individual perception of the whole world is of meaningful whole and that (this) is different from, and more than, an accumulation of sensations, images or ideas (Oladele, 2009). The Gestaltists rejected the simple stimulus – response (S – R) connections as the explanation of behaviour. The concept of organisation between stimulus – response was introduced by the Gestaltists. It is important to note that this means not by associating bits of expressions but by forming new Gestaltists – by seeing new patterns and by organising them into a meaningful whole in the total situation (Alhassan, 2000).

Essentially, Kohler placed a hungry chimpanzee in a cage. Outside the bars of the cage and just beyond its reach was a banana. The chimpanzee (later called Sultan) made a few futile attempts to reach through the bars and gets the banana. Then the chimpanzee noticed a stick lying on the floor of the cage. Picking up the stick, the animal smoothly and without further hesitation reached out and took in the banana. Kohler's explanation as cited in Kimble & Garnezy (2008) was not Sultan had engaged in insightful learning, which is characterised by sudden resolution or action after a period study during which there is no action or apparent understanding. How can insight learning be explained theoretically? A partial answer is that it appears to involve two stages. The first is a process of problem solving, a kind of mental trial and error, in which solutions are tried out and rejected without any actual behaviour being displayed. The second stage is storing the final solution in memory, where it is available for retrieval later. Are cognitive processes the best explanation for conditioning and learning? Some psychologists clearly believe they are, but others are not convinced. They argue that the proposed cognitive processes cannot be directly observed and must be inferred. When cognitive psychologists do not fully understand how a conditioned association takes place, their critics argue, they propose constructs like expectancy, prediction, and cognitive maps to fill the gaps in understanding.

The danger is that such constructs may be difficult to test empirically. This theoretical battle represents a scientifically healthy difference of opinion and promises to continue for many years to come. Mukhejee (2008) reveals that Kohler explained this problem-solving

behaviour by saying that ‘insight’ came to the chimpanzee when the problem was solved. Kohler argues that all problem solving depends on insightful learning. Mukherjee (2008) in analysing the chimpanzee’s problem–solving behaviour states that:

- a. There were several meaningful trials all of them being goal – oriented (directed)
- b. There were several turning away from the goal
- c. There was a pause after sighting the stick lying in a different position from the chimpanzee and the banana and
- d. Then there was solution of the problem with the stick which was used as an extension of arm

The writer further states that such learning can be transferred to new situations whereas there are many regressions in trial and error learning. Kimble and Garmezy (2008) observes rather significantly that the chimpanzee had previously learnt to use implements (such as sticks) to draw to itself desirable objects. By implication, therefore, the insightful solutions to problems may be the result of long experience with the materials involved in any particular problem (situation). Sperling (2009) writes that the chimpanzee seems to have combined a memory image of drawing a banana into the cage with a synthetic image made up of a memory image of extending a rod out of the cage. Oladele (2009) sees the following as the main features of insightful learning:

- i) Learning through insight depends upon the arrangement of the problem situation. Insight will come easily if the essentials for solution are arranged so that relationships can be perceived.
- ii) Complex situations can only be tackled through insight – a higher form of learning than trial and error.
- iii) Insight, like other learning, depends upon the capacity of the learner. Older children, for example, can learn things more easily than younger children.

2.1.14 Theory of Connectionism by Thorndike

It is important to note that Thorndike cited in Alhassan (2000) provided the first systematic approach to understanding behaviour from the standpoint of a behaviourist. He was also the first American Psychologist to introduce the concept of reward (reinforcement) for learning to occur (Alhassan, 2000). Blair (2001) reveals that Thorndike worked as an educational psychologist, a pioneer who maintained an active interest in learning theory, school learning, intelligence testing and educational measurement. Thorndike is the starting point for both educational psychology and America’s brand of objective psychology that is behaviourism.

His stimulus – response (S-R) theory was generated from a series of experiments with a hungry cat put inside a puzzle box with food (fish) visible on the outside.

The cat had to pull a string to come out of the puzzle box. Towards this, the cat made several random movements of jumping, dashing across the floor of the box and running in a deliberate attempt to get out of the box. The cat at last succeeded in pulling the string. The door of the puzzle box opened, the cat came out and ate the food. The time, which it took, was recorded and it was put into the box again and again until such a time that it achieved mastery on how to operate the lever to have its escape. Thus, over a series of successive trials, the cat became increasingly efficient in getting out of the box, the number of errors thus reduced on subsequent trials.

It is important to note that Thorndike's cat showed slow, gradual and continuous improvement in performance over successive trials. Thorndike then concluded that animals learn through active behaviour, accidents and through chance to succeed. Furthermore, he concluded that the learning process in the cat can be explained in terms of formation of direct connection between the stimulus and the response.

Laws Governing Learning

The basic laws and their classroom application are very interesting aspects of the psychology of learning. Such laws are:

The Law of Readiness

This law states that when a modifiable connection is ready to act, to do so is satisfying and, when it is not ready to do so, it is unsatisfying. Readiness is dependent upon both maturation and experience of the learner. Mukherjee (2008) writes that the law of readiness implied “preparatory adjustment of the organism confronted with the problem”. What does this suggest? This suggests that if Thorndike's cat were well fed before it was introduced into the puzzle box; the required response of pulling the lever would not have been obtained. Children will not learn if they are not prepared or do not have interest in learning a particular subject. Now, try this relevant question. What classroom application could be derive from this theory? Chauhan (2008) suggest that the teacher must wait till the learner is ready to learn. The teacher should give those experiences that may help to enhance readiness. Preparatory experiences that will hasten the growth of readiness can be provided in primary classes. Aptitude tests in various subjects may be given to determine the readiness of learners. With the school system, the

teacher needs to take into consideration the developmental stage of the learner, his/her interest, personality, and mental readiness in order to know the type of stimulus to present to the learner, which will lead to a positive response with success as its reward.

Law of Exercise

This law is divided into two parts: the Law of Use and the Law of Disuse. The law of use states that other things being equal, the more frequently a modifiable connection between stimulus and response (S – R) is made, the stronger that connection will be. The law of disuse states that, other things being equal, when a modifiable connection between stimulus and response (S – R) is not made over a period of time, the strength of that connection is weakened. Thus, practice is required, especially in learning skills (simple and complex); repetition also strengthens the connection between the stimulus and the response. Now, the relevance of the law within the teaching-learning process is that the classroom teacher should endeavour to give opportunities (on a sustained basis) to the learners not only to use but also to repeat the knowledge they required in the class. Drill plays an important role in elementary classes, particularly in the learning of multiplication tables, alphabets, and meanings of words. The position of Thorndike is that many drills should be given in elementary classes to strengthen the bondage between S and R.

Law of Effect

Commenting on the law of effect, Mukherjee (2008) writes that only those responses of the organism, followed by reward and satisfaction, would be learned, and those unsuccessful responses followed by punishment and annoyance would be eliminated from the behaviour repertoire of the organism. This suggests that to every stimulus, there was response, and when the response to a stimulus is followed by some positive effect, such as reward and satisfaction, that particular stimulus – response bond (S – R) would be ‘stamped in’, while others followed by some negative effect such as punishment and annoyance, would be “stamped out”. The effect of reward and punishment are not only opposite in nature, but are equally strengthened. It is important to note that this was Thorndike’s initial view, but in his later writings, he emphasised most on positive effect and overlooked the punishment thereby concluding that learning is more effective under reward conditions than under conditions of punishment. This research work was anchored on Thorndike’s Theory of Connectionism as the theoretical backbone, this is because all the three principles of the theory (law exercise, law of readiness and the law of effects) is

very germane to the independent variables, dependent variables as well as the moderating variables used in this study.

2.2 Empirical Review

2.2.1 Enormity of Poor Performance in Mathematics in Public Examinations

Mathematics education is to a nation what protein is to a young human organism. As a vital tool for the understanding and application of science and technology, the discipline plays the vital role of a precursor and germane to the much needed technological and of course national development, which has become an imperative in the developing nations of the world. The choice of this topic is predicated on the current world trend and research emphasis on gender issues following the millennium declaration of September 2000. The United Nations (2000) which has as its goal, the promotion of gender equity, the empowerment of women and the elimination of gender inequality in basic and secondary education by 2005 and at all levels by 2015. In realization of the significant role of Mathematics to nation building, the government of the Federal Republic of Nigeria made the subject compulsory at the basic and secondary levels. This was aimed at ensuring the inculcation of Mathematics literacy and the associated equipment with logical and abstract thinking needed for living, problem solving and educational furtherance. For full realization of this laudable objective of Mathematics education, subject mastery and demonstrated achievement should be evenly distributed across gender. Unfortunately, gender inequality in education has remained a perennial problem of global scope (Bordo, 2001; Reid, 2003).

Mathematics is a science subject and some gender-based science researchers have reported that what both the ‘feminist empiricists’ and the ‘liberal feminist critics’ seem to agree is that females in principle will produce exactly the same scientific knowledge as males provided (Barton, 2008; Sinnes, 2006). They also believe that initiatives that build on the assumption that females and males are equal in their approach to science, and that inequality in science and science education is caused by political, educational and social factors external to science, would be expected to focus on removing these external obstacles. The table 2.1 gives more explanation of the enormity of poor Mathematics learning gains among the students based on WAEC results for the past ten (10) years 2004-2014 in Nigeria.

Table 2.1: Students' Achievement in May/June Senior Secondary School (SSS) Examination (WAEC) 2004-2014

Year	Total Number of Candidates	Credit (A1-C6) %	Pass (D7-E8) %	Fail (F9) %	Absent/ Withheld %
2004	1,019,524	33.97	28.16	34.47	3.40
2005	1,054,853	38.20	25.36	34.41	2.03
2006	1,149,277	41.12	31.09	24.95	2.84
2007	1,249,028	46.75	26.75	24.24	2.26
2008	1,369,127	42.10	24.19	30.41	3.30
2009	1,742,362	16.12	25.08	58.50	1.70
2010	1,367,217	24.75	47.65	26.15	2.45
2011	1,315,138	23.50	58.67	14.62	3.21
2012	1,156,561	25.14	60.27	10.32	4.27
2013	1,324,998	22.00	2.25	59.60	16.15
2014	1,242, 162	16.02	16.12	59.25	8.61

Source: Researcher's Field Work from WAEC Reports

From table above, in 2004 when 1,019,524 enrolled for Mathematics, 33.97% had credit pass (that is A1-C6), 28.16% had ordinary pass (that is D7-E8), and 34.47% had F9 while 3.4% were absent. From this result, it shows that only 33.97% of the enrolled candidates have the opportunity of furthering their education provided they also have credit passes in four other relevant subjects, including English language. In 2005, from 1,054,853 candidates that enrolled, 38.20% had credit pass, 25.36% had ordinary pass that is between D7 and E8, and 34.41% had F9 while 2.03% candidates were absent.

Furthermore, in 2006 from 1,147,277 enrolled, 41.12% had between A1-C6, 31.09% had between D7 and E8, while 24.95% failed and 2.84% candidates were absent. In 2007, 1,249,028 candidates enrolled, 46.75% had credit pass, 26.75% had ordinary pass, 24.24% failed while 2.26% absent from the examination. In 2008, from 1,369,124 candidates that enrolled, 42.10% had credit pass, 24.19% had ordinary pass that is between D7-E8, and 30.41% had F9 while 3.3% candidates were absent. In 2009, from 1, 742,362 candidates that enrolled, 45.12% had credit pass, 25.08% had ordinary pass that is between D7 and E8, and 29.50% had F9 while 1.7% candidates were absent.

In 2010, 1,367,217 candidates enrolled, 24.75% had credit pass, 47.65% had ordinary pass that is between D7 and E8, and 26.15 % had F9 while 2.45% candidates were absent. In 2011, from 1,315,138 candidates that enrolled, 23.50% had credit pass, 58.67% had ordinary pass that is between D7 and E8, and 14.62% had F9 while 3.21% candidates were absent and

finally to avoid duplications in 2012, from 1,156,561 candidates that enrolled, 25.14% had credit pass, 60.27% had ordinary pass that is between D7 and E8, and 10.32% had F9 while 4.27% candidates were absent. Summarily, the table showed the enormity of poor learning gains of students consistently in Mathematics from 2004 till date (for more than ten years). Though there is a steady increase in the percentage of students with credit pass, the conclusion drawn from students' achievement in Mathematics between 2004 and 2012 is that, more than 50% of students enrolled had below credit pass that is A1-C6. This is a source of worry to stakeholders. Scholars have observed the fact that students' learning gains is an output of educational system which cannot be examined in isolation of the inputs and process (Adejumo, Oluwole & Muraina, 2015; Wang & Ye, 2015).

Therefore, World Bank (2001) asserted that good quality of education requires efficient systems that would provide supportive learning environment, motivated staff with mastery of their subject matter, adequate access to resources, and students who are healthy and ready to learn. In the same vein, Obanya (2004) submitted that, it is only a combination of quality inputs and quality processes that can produce quality gains. Concerted efforts have been made at investigating trends of students' achievement in Mathematics as well as factors responsible for the level of their achievement. Some of the reasons attributed to the observed poor achievement in Mathematics as submitted by scholars include; shortage of qualified Mathematics teachers (Ohuche, 2009), poor facilities, equipment and instructional materials for effective teaching (Odogwu, 2004), use of traditional chalk and talk methods (Oshibodu, 2008), large pupils to teacher ratio (Alele, 2008) and Mathematics phobia/fright (Georgewill, 2000; Adejumo, Oluwole & Muraina, 2015; Wang & Ye, 2015), limited background preparation in Mathematics, lack of Mathematics teaching equipment and materials, fright and anxiety, low level of interest and some government policy (Abimbade, 2005), lack of problem solving abilities (Abimbade, 2007), achievement motivation (Akinsola & Animashaun, 2007).

Good physical and mental health of school students is essential if they are to fully participate in education services being offered and if they are to concentrate and learn while in school. There is growing evidence that regular physical activity enhances learning and school achievement. Physical activity fuels the brain with oxygen, enhances connections between nerves and assists in memory. Children who participate in daily activity have shown superior academic performance and better attitudes towards school (Dwyer, Blizzard and Dean, 2006).

This means that, schools with effective health services have better chances of achieving high academic excellence in their students. Not only that, availability of sports facilities which facilitate regular physical activity is also germane to effective learning. Mathematics as a subject affects all aspects of human life at different degrees. The social studies, economics, political, geographical, scientific and technological aspects of man are centered on numbers. Disciplines where numbers are predominant and form integral part of Mathematics include: statistics, accounts, arithmetic, engineering, etc. For example the earliest civilization of mankind came through mathematical manipulations.

The inter-relationship between Mathematics, development and advancement of humans shows the importance of Mathematics in life due to its numeral and symbolic nature, it is more related to the scientific and technological facets of man's world than to any other aspect as it occurs and re-occurs in the physical and natural sciences. The basic skills underlying all scientific and technological skills are the control of the tools of Mathematics. Mathematics is seen as the language used to describe the problems arising in most branches of science and technology (Akinsola & Animasahun, 2007). It is a subject that is related to other school subjects in areas like number and numeration, variation, graphs, fractions, logarithms and indices, algebraic processes, solution of equation and also in area and volume.

However, the performance of students in Mathematics has been a great concern to the society. Awokoya (2005), Fafunwa (1980), both agreed in different researches that human beings live in a world where science and technology have become an integral part of the world culture, therefore for any nation to be relevant; it must not over look the importance of Mathematics in her educational system. Accordingly, the observed poor performance in Mathematics has been a matter of serious concern to all well-meaning educators. Students' poor performance in Mathematics over the years has been attributed to the fact that the subject is difficult. In the same view, student's performance in Mathematics tests has been observed to vary from person to person and from school to school.

2.2.2 Motivational Enhancement Therapy and Mathematics Learning Gains

Motivational enhancement therapy orientates students toward goal-directed learning, persistence at task, developing new skills and cognitive strategies for solving problems. It also leads to emphasis on self-improvement and development using self-referenced standards. The reason for this is that motivational enhancement therapy has achievement goals, and thus

students work hard and exert maximum efforts to reach those goals. It is widely accepted that motivational enhancement therapy plays a crucial role in affecting learning gains of students at different levels of education (Deci & Ryan, 1985; Elliot & Harackiewicz, 1996). Deci and Ryan (1985) and Deci et al. (1991), for example, revealed that students who had more self-determined or autonomous motivation (e.g., intrinsic motivation) for school works and activities were more likely to stay in school and perform better compared to their counterpart students who had less self-determined motivation. In addition, they indicated that high learning gains is a function of students' sense of autonomy.

Specifically, those students who have self-determined (autonomous) motivation for their learning and learning gains are performing the best in their education and as a result they are more successful in their academic performance compared to those who have constrained (non-autonomous) motivation and also who are motivated. Empirical studies conducted in colleges and/or universities, in particular, have also demonstrated that motivational enhancement therapy has a significant and positive effect on learning gains, even though there are some inconsistent findings. For instance, Robbins et al. (2006), in their meta-analysis of 109 studies, found that motivational enhancement therapy had a significant and positive effect on the learning gains of college/university students. Another study with Australian Aboriginal and non-Aboriginal university students revealed that those students who attached high value to achievement goals (that is, the characteristic of students trained with high motivational enhancement therapy) were found to be better academically compared to their counterparts who attached low value to achievement goals (White & Fogarty, 2001).

Research which has examined the effects of different types of motivational enhancement therapy on learning gains and other educational gains, in particular, documented important findings. Vallerand and Bissonnette (1992) study, for instance, demonstrated that junior college students who were more intrinsically motivated, more extrinsically identified and integrated regulated, and less motivated toward academic activities at the start of the semester persisted in the course compared to those students who dropped out of the course. In addition, Vallerand et al. (1989) found that identified regulation of extrinsic motivation (that is, behaviour that are performed by choice or self-determination) was significantly and positively associated with educational gains, although the effect of identified regulation was not as strong as that of intrinsic motivation.

Vallerand and his colleagues also documented that external regulation and introjected regulation of extrinsic motivation were either not correlated or slightly negatively correlated to educational gains. Extrinsic motivation, when taken in its global form, was either negatively related (Mitchell, 1992; Turner & Heffer, 2005) or not related to learning gains. In addition, research has documented that motivation (that is, lack of motivation) was negatively associated with academic performance of college/university students (Fairchild, Horst, Finney, & Barron, 2005; Turner, Chandler, & Heffer, 2009). A plethora of research has revealed that those college and/or university students who were more intrinsically motivated were more academically successful (Turner, Chandler, & Heffer, 2009; Turner & Heffer, 2005).

Empirical studies in non-Western countries such as Malaysia, Japan, and China have also documented that motivational enhancement therapy plays a vital role in affecting the academic performance of university students. Specifically, a recent study with a sample of university students in Malaysia reported a significant and positive correlation between students' motivational enhancement therapy and their learning gains (Mahyuddin, Elias, & Noordin, 2009). Tanaka and Yamauchi (2000) study with a sample of Japanese undergraduate students also demonstrated that autonomous motivation had a significant and positive effect on mastery orientation, deep-level processing, and learning gains, whereas external regulation of extrinsic motivation significantly and positively predicted work-avoidance orientation and had a significant and negative association with learning gains.

Furthermore, a study by Vansteenkiste, Zhou, Lens, and Soenens (2005), with a sample of Chinese students, revealed that autonomous (self-determined) motivation had a significant and positive influence on adaptive (positive) learning attitudes, academic success, and personal well-being, whereas controlled (non-autonomous) motivation had a significant and positive association with higher drop-out rates, maladaptive (negative) learning attitudes, and ill-being (discomfort). Similar findings have also been reported in research conducted in Africa. For example, Ali (2015) investigated the relationship between motivational enhancement therapy and academic performance with a sample of college students in Zambia. He found a significant and positive relation among motivational enhancement therapy and academic performance, indicating that students who had high motivational enhancement therapy performed significantly better than their counterparts who had low motivational enhancement therapy on academic performance, as measured by the averages of the term examination grades.

Research with high school students has also documented consistent findings that motivational enhancement therapy plays a vital role in significantly and positively affecting learning gains. For example, a study with a sample of 263 French-Canadian grade nine students from two Montreal high schools revealed that those students who were competent and self-determined in the school setting had autonomous motivational profiles, these students in turn had higher learning gains than their counterparts who were incompetent and not self-determined (Fortier, Vallerand, & Guay, 1995). Another study with a sample of 1381 Hong Kong Chinese students (786 males and 595 females) from three secondary schools in Hong Kong also found that intrinsic motivation was significantly and positively related with learning gains (Lai et al., 2006).

2.2.3 Motivational Enhancement Therapy and Mathematics Learning Readiness

Motivational enhancement therapy correlates significantly with learning gains and learning readiness in middle school students. Antisocial behaviour and failures to regulate their emotions are related to poor learning readiness (Fredricks, 2004; Gumora & Arsenio, 2002). Similarly, Finn and Rock (1997) examined a large sample of minority, low-income students in grades 8 to 12. They found that better students were less likely to engage in problem solving behaviour. These findings are consistent with other developmental studies, which describe the effects of students' motivational behaviour, emotions, and learning gains (Masten, 2005; Moilanen, Shaw, & Maxwell, 2010). Some studies also show that emotional problems, such as anger, sadness, or depression, are mildly related to poor learning readiness in 7th and 8th grades (Roeser, Eccles, & Sameroff, 2000). On the other hand, studies show that students who could regulate impulsive behaviour were more likely to have better learning readiness (Hair & Hampson, 2006; Spinella & Miley, 2003). Although many studies show linear relationships between motivational enhancement therapy and learning readiness (Duckworth & Seligman, 2005; Wolfe & Johnson, 1995), Robbins et al. (2006) found a curvilinear relationship between motivational enhancement and learning readiness in college students. That is, motivational enhancement (low or high) was associated with poor learning readiness in the freshman year of college.

Motivational enhancement therapy has been found to be positively correlated to achievement, with highly motivational enhanced students are more eager to use planning, organisational, and self-monitoring strategies than low motivational students (Pintrich & De-

Groot, 1994; Mousoulides & Philippou, 1990). Pintrich and De-Groot (1994) have articulated a model of student cognition, which argued that students regulate their cognition by using motivational strategies in addition to cognitive strategies. Despite the importance of motivational enhancement therapy for students' learning readiness, there has been relatively little empirical research on students' motivational enhancement therapy with such Mathematics learning readiness. Recent studies have either attempted to identify the strategies learners use during learning (Greene & Land, 2000; Hill & Hannafin, 1997) and to identify the effectiveness of embedded strategies in Mathematics and science learning readiness (McManus, 2000). The latter set of studies has attempted to identify the effectiveness of embedded motivational enhancement therapy strategies such as advance organizers, navigation maps, note-taking, and Mathematics learning readiness (Eom & Reiser, 2000; Hartley, 2001). However, these studies indicate that high-motivated learners tend to outperform (but not significantly) the low-motivated learners in Mathematics environments. In general, learners who do not plan or activate their prior knowledge, rarely use motivational therapy processes, use ineffective strategies, and exhibit difficulties in handling task difficulties and demands (Azevedo, Cromley, & Seibert, 2004; Azevedo, Guthrie & Seibert, 2004).

Several researchers have recently examined how students were motivated to their learning readiness in Mathematics. These studies offer theoretical and methodological advantages by adopting models of motivational enhancement therapy (Winne, 2001; Winne & Hadwin, 1998) and examining the dynamics of motivational enhancement therapy to explore how students regulate their learning in Mathematics. A study by Azevedo, Guthrie, and Seibert (2004) on college students' ability to learn about complex science topics examined whether students could regulate their own learning readiness. The results indicated that students differ in their ability to regulate their learning. Students who showed significant learning readiness from pretest to posttest regulated their learning by using effective strategies, planning their learning by creating subgoals and activating prior knowledge, monitoring their emerging understanding, and planning their time and effort. In contrast, those who did not show large learning readiness used equal amounts of effective and ineffective strategies, planned their learning by using subgoals and recycling goals in working memory, handled task difficulties and demands by engaging mainly in help-seeking behaviour, and did not engage in much monitoring of their learning (Akinsola & Animasahun, 2007). This study established that not all students were

capable of regulating their learning readiness, that some were led to inferior learning readiness, and that those who did learn deployed certain key mechanisms during learning.

A subsequent study by Azevedo, Cromley, and Seibert (2004) examined the effect of different learning interventions on facilitating students' readiness. Fifty-one students were randomly assigned to one of three conceptual learning strategies (no scaffolding, fixed scaffolding, and adaptive scaffolding). Learners in the adaptive-scaffolding condition, in which students had access to a tutor to regulate their learning, learned significantly more than those in the other conditions. The tutor in the adaptive instructional condition assisted students in establishing goals, monitoring emerging understanding, using effective strategies, and providing motivational learning readiness. Learners in the no-scaffolding condition and the fixed-scaffolding condition (who were given a list of expert-set subgoals to guide their learning) were less effective at regulating their learning and exhibited great variability in self-regulating their learning during the knowledge construction activity.

Similar study by Azevedo, Cromley, and Seibert (2004) provides additional evidence that not all students are capable of regulating their learning readiness, that this inability leads to inferior learning gains, and that these same students fail to deploy certain key motivational enhancement therapy mechanisms during learning. Also, these results provide a valuable initial characterization of the role of motivational enhancement therapy in accounting for differences in conceptual knowledge gains when students are ready to learn about complex science topics.

2.2.4 Self-Monitoring Skill Training and Mathematics Learning Gains

Researchers into Mathematics learning gains in children have extensively reported improved classroom behaviour or performance due to self-monitoring (Lam, Cole, Shapiro, & Bambara, 1994; Reid & Harris, 1993). However, not all studies of self-monitoring and behaviour modification have yielded positive results. Self-monitoring was ineffective in increasing productivity in a study of adults with poor Mathematics learning gains (Shapiro & Ackerman, 2003). Mixed results are also reported from studies examining the impact of self-monitoring on learning gains in Mathematics. Mace and Kratochwill (1985) showed that self-monitoring significantly reduced Mathematics gains in college students and Lan's (1993) experiment on the effects of self-monitoring on college students' statistics course grades resulted in the self-monitoring group outperforming the instructor-monitoring and control groups. However, in a similar experiment involving children studying Mathematics (Schunk,

1983), the post-treatment achievement scores of the self-monitoring group of children were comparable with those of the externally monitored group.

Self-monitoring also failed to improve learning gains in a study of undergraduates' monitoring of success and failure in solving anagrams (Susser, 2001). Whereas self-monitoring studies in education have been both behavioural and cognitive in nature, self-monitoring researchers have focused solely on cognitive aspects. A cross-sectional Mathematics monitoring study by Hest (2000) showed that the ability to monitor one's problem solving errors is a valid predictor of acquisition. In a review of monitoring and self-repair in Mathematics learning gains, Kormos (1999) concludes that the self-monitoring of students aids acquisition and is a positive correlate of Mathematics learning gains. In two descriptive studies, Charles (1990) and Cresswell (2000) emphasized the importance of self-monitoring through the technique of writing notes or annotations. Checking one's reading comprehension is also considered useful and is recommended for developing reading skills (Block, 1992). It has been extensively argued that self-monitoring and similar strategies are characteristics of good learners and enhance learning (Wenden, 1991). Despite these arguments for the effectiveness of self-monitoring, there has been little experimental evidence supporting claims that self-monitoring improves second language performance.

Many studies that have manipulated self-monitoring and strategies similar to self-monitoring in the classroom yielded only two. Other studies offered anecdotal, theoretical, or correlational evidence. One of the empirical studies was by O'Malley, Chamot, Stewner-Manzanares, Russo, and Kupper (1985), who found statistically significant differences on speaking but not on listening posttests between treatment and control groups. The treatment group but not the control group were taught and directed to self- and peer-monitor their notes on the main points and cohesive markers of short speeches. However, only the treatment group was taught how to identify main points and cohesion markers. In other words, only the treatment group was explicitly taught structures and linguistic cues that would end up on the post-treatment test.

The treatment group in another experimental study (Viswat & Jackson, 1994; Georgiou, 2015) was also given more instruction than the control group, but in the form of additional pre-listening questions, which were designed to lead students to make use of the title, pictures, and information in the introductory statement to predict. Furthermore, significant teacher effects

owing to different teachers teaching the strategies were observed. Viswat and Jackson (1994) thought that this may have contributed to the large effect size of .57 in one of the treatment groups and felt that the study's results were not conclusive but promising. Oxford (1992) and O'Malley and Chamot (1990) have documented much of the theory and research into metacognitive learning strategies such as self-monitoring, but most of these rest solely on theoretical arguments. The lack of experimental investigations into self-monitoring, and the bias due to the treatment groups' added exposure to the target concepts, as in the two studies discussed above, points to the need for more research before claims can be made for the effectiveness of self-monitoring.

Lan (1993) and Schunk (1983) provided external or teacher-monitoring to the control group and comparing the results with those of the self-monitoring group. The control group was externally monitored by the instructor while each student in the treatment group monitored himself or herself, thus eliminating confounding effects due to one group receiving additional instruction. The time needed for the self-monitoring or strategy intervention was another variable considered. Time is an important factor in determining the efficacy of self-monitoring, yet in the self-monitoring literature examined, the proportion of time required for self-monitoring strategy and training administration was never reported. In a critical review of learner training, Rees-Millar (1993) addressed this issue, suggesting that if an excessive amount of time is required for strategy training, it may be better to use instructional resources for traditional tasks. The intervention in the O'Malley et al. (1985) study mentioned above required 7 hours in a semester. Although the total number of class hours in a semester was not mentioned, 7 hours is still a considerable amount of class time. Time is an important factor in teaching decisions and needs to be included in discussions on the practical implications of self-monitoring intervention.

The ability of a student to self-monitor his or her performance is a natural step toward becoming independent, which can only happen when students take responsibility for their own behaviour and essentially become agents of change (Porter, 2002; Rutherford, Quinn, & Mathematicsur, 1996). Self-monitoring is defined as the practice of observing and recording one's own academic and social behaviour (Hallahan & Kauffman, 2000; Vaughn, Bos, & Schumm, 2000). Being able to self-monitor reflects a shift from reinforcement by others to self-reinforcement of appropriate behaviour (Hanson, 1996). There are a number of systems of self-

recording and self-monitoring procedures that stem from social skills and behaviour management programs; however, self-monitoring can also be used effectively with academics (Hanson, 1996; Rutherford, Quinn, & Mathematicsur, 1996). Furthermore, self-monitoring can be used both to assess where students are functioning academically and behaviourally and to improve academic or behavioural performance (Carr & Punzo, 1993; Rutherford, Quinn, & Mathematicsur, 1996).

Self-monitoring is a strategy that can be used with students of all ages and disabilities (DiGangi, Maag, & Rutherford, 1991), is relatively unobtrusive, appeals to students, and is inexpensive and relatively quick to implement (Carr & Punzo, 1993). Self-monitoring has been shown to be effective in increasing more appropriate behaviour, increasing on-task behaviour in the classroom, enhancing completion of homework assignments, improving both academic performance and social skills, and reducing disruptive behaviour (Carr & Punzo, 1993; Hallahan & Kauffman, 2000). In addition, self-monitoring actively engages the student as a participant in improving his or her behaviour (Blick & Test, 2007), thereby increasing his or her investment in the process. Also, self-monitoring techniques is an effective tool for generalizing and maintaining skills over time, because students can perform them any time and in any setting without needing an adult to help them (Rutherford, Quinn, & Mathematicsur, 1996). However, students first need to be taught how to self-monitor their academic and social behaviour.

If a student is monitoring his or her on-task behaviour, for example, he or she may ask “Am I on task?” when a timer goes off and tally the answer on a recording sheet. As the student learns to monitor his or her performance on a regular basis, the timer is phased out (Blick & Test, 2007). Students will need to practice repeatedly each of these steps and then implement them in actual social or academic situations. These steps can either be taught by a teacher (Schunk, 1997; Smith, 2002) or with the assistance of peers (Gilberts, 2000). Students must be taught to self-evaluate their success each day (Vaughn, Bos, & Schumm, 2000). The probability of the internalization of these skills increases if the student participates in a structured and predictable school environment. Also, the teacher should be prepared to periodically introduce a scaled-down version of the original instruction, if there is a decline in these skills.

To make self-monitoring most effective, strategies should be used constantly and overtly at first and then faded to less frequent use and more subtle use across time (Stainback & Stainback, 1980). It is also important to ensure that students have learned the skills and

behaviour that teachers want them to perform as they are using the self-monitoring strategies. To help maintain and generalize positive behavioural changes, self-monitoring should be combined with methods that allow students to evaluate themselves against their earlier performance and to reinforce themselves for their successes.

2.2.5 Self- Monitoring Skill Training and Mathematics Learning Readiness

Self- monitoring learning is controlled by an interconnected framework of factors that determine its development and sustainability (Pintrich, 2000; Zimmerman, 2008) and learning readiness is a critical factor in this framework (Ommundsen, Haugen & Lund, 2005; Wang & Holcombe, 2010). For example, during the forethought and planning phase of learning, when students consider why an activity should be completed and how much effort to put toward that activity, their interests and values are factored into the decision and learning readiness (Simons, Dewitte, & Lens, 2000; Wolters, Yu, & Pintrich, 1996). If students do not see value in learning tasks, then they are less likely to spend much time setting goals and planning strategies to accomplish those tasks. Additionally, students' learning readiness and their confidence in their ability to successfully complete tasks also play a role, especially during the forethought and planning and performance monitoring phases (Zimmerman, 2000). Research has found self-efficacy and the use of self-monitoring learning strategies to have reflexive positive impacts on one another. Higher self-efficacy beliefs increase the use of self-monitoring learning strategies (Pajares, 2008) and the use of self-monitoring learning strategies can lead to increases in self-efficacy beliefs and academic learning readiness (Bouffard-Bouchard, Parent, & Larivee, 1991; Zimmerman & Martinez-Pons, 1990).

During the performance monitoring phase, students continuously assess the meaningfulness of the learning task, learning readiness, the level of effort and persistence used in completing the assignment and use of self-monitoring strategy. Also, students' causal attributions (the factors students attribute to their success or failure for a specific task) play a key role in the reflection on performance phase, as students make decisions of whether or not they will engage in an activity and utilize self-monitoring learning strategies for similar activities in the future. In general, self-monitoring skill training and students' learning readiness work hand in hand to explain student learning and success in the classroom. When students are motivated to learn, they are more likely to invest the necessary time and energy needed to learn and apply appropriate self-monitoring skills, and when students are able to successfully employ

self-monitoring strategy, they are often more motivated to complete learning tasks (Zimmerman, 2000).

Research has revealed that high achievers reported more use of self-monitoring skill training than lower achieving students (Pintrich & DeGroot, 1994; VanZile-Tamsen & Livingston, 1999), and the assumptions of self-monitoring offer optimistic implications for teaching and learning. Self-monitoring is neither a measure of mental intelligence that is unchangeable after a certain point in life nor a personal characteristic that is genetically based or formed early in life. Students learn self-monitoring through experience and self-reflection (Pintrich, 1995). Teachers can teach in ways that help students become self-monitored learners (Coppola, 1995; McCombs, 1989). Since self-monitoring is not a personality trait, students can control their behaviour and affect in order to improve their learning readiness and performance. In addition, self-monitoring is particularly appropriate for college students, as they have great control over their learning readiness and time schedule, and how they approach their studying and learning (Pintrich, 1995). When self-monitoring learners find inadequate learning strategies, they monitor their learning activities and readiness. Monitoring refers to the fine-tuning and continuous adjustment of one's cognitive activities (Pintrich et al., 1991). Monitoring activities enhance Learning Readiness and Gains by employing a feedback during learning process (Zimmerman, 1989), and self-monitoring training has been found to enhance learning readiness and performance across a wide variety of academic measures. Thus, students can become better learners if they become more aware of their learning and then choose to act on that awareness.

The main aspect of self-monitoring learning strategy is metacognition, and it includes planning, monitoring, and regulating activities (Pintrich et al., 1991). Planning involves setting educational goals and gains as well as task analysis. Self-monitored learners set specific learning or performance gains, and then monitor the effectiveness of their learning methods or strategies and respond to their evaluations (Zimmerman, 1989). Self-monitoring is essential in enhancing Learning Readiness and Gains. It helps students focus their attention on and discriminate between effective and ineffective performance and reveals inadequate learning strategies. It improves time management and learning readiness as well (Zimmerman & Paulsen, 1995).

Studies also show that metacognitive skills enhance permanent learning and success (Cooper, 2008; Georgiades, 2004), improve questioning skills (Kramarski, 2008), develop

social skills and success when used cooperatively (Flavell, 2000), enhance cognitive regulation (Mevarech & Amrany, 2008), help time management (Rosetta, 2000), and improve thinking and problem solving skills of learners. Similarly, (Desoete 2008; Shamir, Mevarech, & Charmit, 2009) found that self-monitoring skill training had positive effects on academic success and problem solving skills of learners. Studies at national level (Balci, 2007; Demir, 2009) also found that self-monitoring skill training enhanced academic success and problem solving skills of learners. Acquisition of metacognitive skills leads learners to flexible thinking, planned study, and more effective problem solving skills. It is important to note that theorists agree that the most effective learners are those who can regulate their own learning (Butler & Winne, 1995). On the other hand, since learners have different metacognitive skills and knowledge, their learning pace and levels differ (Woolfolk, 1993). In line with this, the most effective way of self-regulation is the correct evaluation of what is known and what is not known (Louca, 2003).

Monitoring one's physical and social environment includes study environment management and help seeking (Zimmerman & Risemberg, 1997). Management of study areas requires locating a place that is quiet and relatively free of visual and auditory distractions so that one can concentrate. Zimmerman and Martinez-Pons (2014) found that high achievers reported greater use of environment management than low achieving students, and self-monitored learners tend to restructure their physical environment to meet their needs. However, substantial evidence has indicated that seeking assistance from others is a valuable self-monitoring, proactive learning strategy that can provide the foundation for autonomous achievement (Karabenick, 1998). Evidence exists that students characterized as having achievement-motivated, active, master/task-oriented approaches to learning are more, rather than less, likely to seek help when necessary, supports the perspective that seek academic assistance and reflects an appropriate strategic response to learning (Ames & Lau, 1982). However, help seeking is different from other learning strategies in that it is also a social interaction. Therefore, it is likely that social motives will influence the use of help seeking (Ryan & Pintrich, 1998).

It is important to recognise how classroom-preparedness skills include and are closely related to on-task behaviour, academic engagement, academic productivity and performance as this behaviour are described conceptually and measured in the self-monitoring research. Classroom-preparedness skills are organisational behaviour that enables the students to meet

academic demands which can include preparing materials, listening, following directions, attending to instruction, staying seated, completing tasks, and finishing work on time (Gureasko-Moore, DuPaul & White, 2007). On-task behaviour can be viewed as a component of classroom preparedness and is often defined as focusing eyes on the material or teacher, holding a pencil, active execution of any step in the academic task, asking for help and remaining seated to complete assigned work (Harris, 2005; Stahr, 2006). Similarly, academic engagement is used to measure if the student is attending and on task (Brooks, 2003). The end result of academic engagement or on-task behaviour can be academic productivity or work completion, as well as academic performance which can include accuracy measures. Self-monitoring of classroom preparedness can therefore be related to self-monitoring of attention, on-task behaviour, engagement, academic productivity, work completion, performance and accuracy.

2.2.6 Gender and Mathematics Learning Gains

Gender is one of the personal variables that have been related to differences found in motivational functioning and learning gains. Different research has demonstrated the existence of different attribution patterns in boys and girls, such that while girls tend to give more emphasis to effort when explaining their performance (Lightbody, Siann, Stocks, & Walsh, 1996; Georgiou, 2015), boys appeal more to ability and luck as causes of their learning gains (Burgner & Hewstone, 1993). Different research has also pointed out that girls usually make external attributions for successes and failures, and that when they make internal attributions, these refer not so much to effort, but to ability (Postigo, Perez & Sanz, 1999). However, boys usually attribute successes to stable internal causes like effort, thus showing an attributional pattern which enables them to enhance their own image of themselves (Smith, Sinclair & Chapman, 2002).

Research of gender differences in cognitive processes, intellectual abilities, area of interest, stereotypical perceptions of every-day behaviour and the ability to perform various tasks has not been conducted. Two theories explaining Mathematics learning gains differences between men and women have been proposed. The first suggests that the male is the prototypical human, and females should be understood in relation to men. The second opines that men represent the cognitive domain, which is positively valued in African culture, and women represent the less-valued affective realm (Hall & Lucas in Klein, 2004). The differences

in the scholastic achievements of boys and girls are generally attributed to biological causes and/or to cultural and stereotypes (Klein, 2004). The last two decades have been devoted to addressing gender inequality in education. Some studies (Okebukola, 1993; Jiboku, 2008) have shown an all time low participation of women in education. Educators have therefore expended tremendous efforts in the study of the personal factors affecting learning gains especially in the sciences and social sciences. Notable among these variables is the study of the phenomenon of gender or sex equity in education. A rich harvest of explanation of causes, understanding of cost to the society and possible intervention has brought about several researches, workshops, seminars and training in this area.

In Nigeria, gender issues abound in all spheres of the society. The educational conditions of the girl-child vis-à-vis the boy-child constitute an important gender issue. In our cultural setting, the cultural and traditional responsibilities of men and women are different; hence the influences in the upbringing of the female child and male child (Adejumo, Oluwole & Muraina, 2015; Wang & Ye, 2015). As Bisong (2006) observes those who operate a curriculum meant to foster integration of courses for girls and boys are likely to unconsciously reflect the cultural bias. In addition to the cultural norms, girls and women are regarded as frail and needing protection because of their supposedly physical strength and the natural processes they are subjected to. Gender involves the psychological and socio-cultural dimensions of being male or female. A gender role is a set of expectations that prescribes how females or males should think, act, and feel.

The concept of gender classification involves a personality-trait-like categorization of a person (Santrock, 2005). However, it is important to think of personality in terms of traits and contexts rather than the personality traits alone. The importance of considering gender in context is nowhere more apparent than when examining what is culturally prescribed behaviour for females and males in different countries around the world (Gibbons, 2000). In the social roles view, women have less power and status than men do and control fewer resources. The social cognitive theory of gender emphasizes that adolescents' gender development influenced by their observation and imitation of others' gender behaviour, as well as by rewards and punishments of gender appropriate and gender inappropriate behaviour. Parents and siblings influence adolescents' gender. Peers are especially adept at rewarding gender appropriate behaviour. In a study conducted many years ago by Maccoby and Jacklin (2004), it was

concluded that males have better Mathematics and visuospatial skills (the kinds of skills an architect needs to design a building's angle and dimensions) than females, whereas females have better verbal attitudes than males. Subsequently, Maccoby cited in Gibbons (2000) concluded that the verbal differences between females and males had virtually disappeared, but that the Mathematics and visuo-spatial differences persisted.

Although women's representation in science and Mathematics occupations has increased during the past few decades and the gender gap in test scores in these fields has declined, science and Mathematics continue to be stereotyped as male domains (Correll, 2001; Steele, 1997). For example, girls are still less likely than boys to see themselves as future scientists (Stake & Nickens, 2005). Girls also continue to express less interest in science and Mathematics during the high school years and perceive themselves as less proficient in these areas compared to boys despite comparable performance levels (Correll, 2001; Xie & Shauman, 2003). Prior research on the science and Mathematics gender gap has highlighted the role of adult significant others who function as same-sex mentors to facilitate girls' and young women's achievement and persistence in these fields. From teachers and professors to mothers or other relatives who are employed in science, technology, engineering, and Mathematics fields, these women offer a tangible representation of what is possible for adolescent girls in their own lives. These individuals also provide a role model for girls to follow in their own pursuit of these fields, since they can simultaneously relate to the general struggles of succeeding in science and Mathematics, as well as to the specific obstacles faced by girls and women.

A vast literature concerning gender differences favouring males in Mathematics and science has arisen over the past several decades in academic, practitioner and public policy fields. The enquiry covers differences in cognitive ability, school achievement, and achievement in standardized tests, attitudes, motivation, participation and course-taking. For a time, small but persistent achievement gaps in standardized tests, primarily in the U.S., highlighted the need to address teaching practices, attitudes, learning behaviour and other factors associated with the under-performance of girls. In contrast to this, recent evidence reveals that gaps in Mathematics and science have narrowed substantially or perhaps disappeared altogether, suggesting that these efforts have paid off. When performance in Mathematics is compared to that of language the differences if any between boys and girls seems to lie in the consistent better performance in tests of reading and writing skills (Georgiou, 2015). School factors might also underlie gender

differences and include such things as access to resources, individual guidance and encouragement, the presence of role models, especially proximal ones in the school environment, curriculum tracking, teacher expectations, teaching practices and teacher-student interactions. School factors do represent the most direct policy levers with which to address imbalance in school performance. Karp and Shakeshaft (1997) suggest that gender specific student-teacher interaction could influence observed differences in Mathematics scores controlling for differences in course-taking.

Also, societal factors that can lead to gender differences in Mathematics achievement have been widely studied. The disadvantages associated with low socioeconomic status lead to lower than average test scores for low socio-economic status students. In widely available U.S. datasets, parents' education, family income and family possessions are usually used as measures of socio-economic status. There is some evidence that socioeconomic status impacts women more than men. Ware et al. (2005) shows that women from more privilege backgrounds are more likely to choose science major and among those in science majors, women are more likely than men to have mothers employed in prestigious occupations (Ware & Lee, 2005). Sax (1996) found that women with science, Mathematics or engineering undergraduate degrees whose mothers were research scientists or college teachers were more likely to pursue graduate work.

2.2.7 Gender and Mathematics Learning Readiness

Gender is a cultural construct that distinguishes the roles, behaviour, mental and emotional characteristics between females and males developed by a society. Umoh (2003) sees gender as a psychological term used in describing behaviour and attributes expected of individuals on the basis of being born as either male or female. According to Okeke (2003), the study of gender is not just mere identification of male and female sexes. Scholars have gone further to identify responsibilities assigned to opposite sexes and to analyze the conditions under which those responsibilities are assigned. Furthermore, Okeke (2003) specifically notes that the study of gender means the analysis of the relationship of men and women including the division of labour, access to resources and other factors which are determined by society as opposed to being determined by sex. It further involves the study of the socio-cultural environment under which responsibilities are assigned and the relationships emanating from it. Thus, gender equally projects the properties that distinguish and classify organisms on the basis of their reproductive and cultural expectant roles.

Yoloye (1998) submitted that the result of the direct transfer of western curricula is a science and Mathematics education in most African countries that is exemplified by decontextualized knowledge being transmitted by poorly trained teachers in under-resourced and sometimes overcrowded classrooms. As a consequence, the situation in Nigeria is that, academic performance in Mathematics education is still deplorably low, both in certificate and non-certificate examinations. Many researchers identify inherent unfairness in school-based assessment (Griffith, 2005; Asim, 2007) which may result from teachers' incompetency in assessment (Asim, 2007), as well as learning readiness among other psycho-cultural factors being responsible for this anomaly. This poor Mathematics learning readiness of students is further worsened by gender imbalance leading to the problem which now constitutes a major research focus across the globe. In a study by Opolot-Okurut (2005) it was found that for all the attitudinal variables (anxiety, confidence and learning readiness), males had higher mean scores than females. That is, differences in student learning readiness in Mathematics based on gender were confirmed. Gender is known to have positive relationship with student learning readiness. This may be an indication that males perform better than females mathematically as a result of their higher learning readiness scores.

Students' learning readiness is one of seven national education priorities (U. S. Department of Education, 2000). Meanwhile, according to Mc-Cabe (2000) in a national study of Mathematics education, 41% percent of entering high school students and 29% of all entering high school students are underprepared in at least one of the basic skills of reading, writing, and problem solving. Since the 1980s, colleges have increasingly required placement testing to determine students' learning readiness and offered or required developmental or remedial education for students placing below high school level (Amey & Long, 1998; King, Rasool, & Judge, 1994). While the rise in developmental programs and courses at school might indicate that the problem of under-preparedness is growing, under-preparedness for high school level work is not a new phenomenon; rather it is a historical problem (Platt, 2006). Even as a Mathematics education becomes increasingly imperative for social and economic success (Day & Mc-Cabe, 1997; Lavin, 2000; Ntiri, 2001), access to high school is problematic for non-traditional or high-risk students. This situation is due to issues of academic, social, and economic readiness (Hoyt, 1999; Valadez, 1993). Increasingly, decisions about Mathematics readiness are made by standardized assessments. In the recent past, some students maintained

open enrollment policies that allowed non-traditional students to enter the system, but that is changing. Standardized-test-based admissions may overlook non-traditional students' historical and cultural background that might include strengths as well as deficits related to readiness for college.

Experts in the study of gender such as Hyde (2004) and Hyde and Mezulis (2001) believed that the cognitive differences between females and males have been exaggerated. For example, Hyde (2004) points out that there is considerable overlap in the distribution of females and males scores on Mathematics and visuospatial tasks. In a personal study by the U.S. Department of Education (2000), boys did slightly better than girls at Mathematics and science. Overall, though, girls were far superior students, earning better grades and were significantly better than boys in reading. In another national study, females had higher reading achievement and better writing skills than male with the gap widening as students progressed through school (Coley, 2001). Females are more likely than male to be assigned to special/remedial education classes – females are more likely to be engaged with academic materials, be attentive in class, put forth more academic effort, and participate more in class than boys (Dezolt & Hull, 2001).

A probable reason for inequality in sex selection in some sex dominated subjects could be adduced to mere cultural and social orientation from parents and the entire society. However, the researcher is of the opinion that this idea can be readjusted for a better socioeconomic society where all individuals are given equal opportunity to perform all tasks irrespective of their sex. Campbell, Hombo and Mazzeo (1999), arguing along the same line, asserts that sex is not a good predictor of academic skills, interest or even emotional characteristics. According to Campbell et al (1999), the difference between individual girls and boys are much greater than those between average boys. Arguing further, they posit that there is the tendency for people to generalize from the average girls or the average boy to individuals. To them, averages can be very deceiving sometimes.

2.2.8 Gender and Mathematics Anxiety

Ikegulu (2000) studied the influence of gender and Mathematics anxiety on the academic performance of college students. Surprisingly, He reported that the cumulative grade point average and persistence rates did not differ between high and low Mathematics anxiety groups. T-tests revealed no differences between students with low and high levels of anxiety which contradicts one of his own previous studies (Ikegulu, 2008; Adejumo, Oluwole &

Muraina, 2015; Wang & Ye, 2015). In his 1998 study of college Mathematics students, he found that Mathematics anxiety contributed 27% of the variance in academic performance (cumulative grade point average) among college students enrolled in various levels of Mathematics. As would be expected, in his 2000 study that focused exclusively on developmental learners, he reported an inverse correlation between Mathematics anxiety and learning gains (Ikegulu, 2000). Furthermore, analysis of variance revealed that Mathematics anxiety and gender interacted together in significantly influencing the cumulative grade point average of students (Ikegulu, 2000). The cumulative grade point average and persistence rates of female students were higher for both the low and high anxiety groups than for male students with the respective level of Mathematics anxiety (Ikegulu, 2000). That was not the case, however, in his previous study, as it revealed no interaction effect among college students enrolled in advanced levels of Mathematics (Ikegulu, 2008).

Mathematics anxiety is more closely associated with females than with males (Macrae, 2003), a finding shared by Ashcraft (2002), but the difference tends to be small and perhaps due in part to a more open disclosure of feelings by women, although Ashcraft and Faust (1994) also found the opposite tendency at low anxiety levels. There are differences, too, in teachers' expectations of females and this can result in differential treatment in the classroom (Osborne, Black, Boaler, Brown, Driver & Murray, 1997). The importance of gender difference in the association of anxiety in Mathematics with test and trait anxiety is further underscored by the results of Frost (2004) who discovered that large gender differences do exist with respect to readiness towards Mathematics. She noticed that slight differences may be found concerning anxiety towards Mathematics, girls being more anxious than boys.

Idu (2008) and Omirin (1999) find out that no significant difference exists between the scores of male and female students on the same instruments developed for measuring readiness towards Mathematics and science oriented subjects respectively. The study of Adebule (2004) on a comparative investigation as to whether there will be any significant difference between the scores of male and female students on a locally standardized rating scale in Mathematics for Nigerian students showed that there was no significant difference between the ratings of both male and female students and that gender issues did not influence the response on the scale. Looking at literature on gender and anxiety it is obvious that it is inconclusive, thus, it becomes justifiable to speculate that gender could act as a moderating variable in this study.

Ikegulu's research demonstrates that the combined effect of Mathematics anxiety and gender may influence the academic performance of students differently than their college-ready peers (Ikegulu, 2008, 2000). Both studies used cumulative grade point average as the dependent variable; however, that measure may not accurately reflect students' performance in Mathematics courses (Ikegulu, 2008, 2000). Differences exist with regard to Mathematics anxiety on the basis of demographic characteristics, including ethnicity, gender, and age. By the time students reached high school, Mathematics anxiety had increased significantly faster among white students than Asian and Black students (Ma & Cartwright, 2003). Ho, Brown, Driver and Murray (2000) investigated differences in the cognitive (worry) and affective (nervousness, fear, dread) dimensions of Mathematics anxiety on Mathematics achievement of students from the United States, Taiwan, and China. Through structural equation modeling, they discovered that affective dimensions of Mathematics anxiety inversely affected Mathematics performance among students from all three nations; whereas the cognitive dimension of Mathematics anxiety only affected the performance of Taiwanese students. Because cognitive Mathematics anxiety was positively related to achievement in Taiwanese students, the researchers inferred that worry may serve as a motivating factor among Taiwanese students (Ho et al., 2000).

Betz (2008) found that non-traditional aged women were more prone to Mathematics anxiety than were traditional-aged college students. Likewise, Bessant (1995) concluded that non-traditional aged students experienced more Mathematics anxiety. Bitner's (1994) results differed, however. He reported that traditional and non-traditional aged students did not differ in Mathematics anxiety levels prior to psychological treatment. Following a study in which the experimental group received systematic desensitization treatments, Ho et al (2000) found that Mathematics anxiety decreased more in traditional aged than non-traditional aged students. Thus, it appears that the treatment was more helpful to younger students.

Some studies have indicated that female college students are more likely to experience Mathematics anxiety than their male counterparts (Bessant, 1995; Hembree, 1990). Contrary to that, other researchers found that the prevalence of Mathematics anxiety was similar in males and females (Kazelskis et al., 2000; Ma, 1999). Fennema and Sherman (2007) reported that gender differences in Mathematics performance did not exist after accounting for Mathematics background and affective measures. Likewise, Alexander and Cobb (2004) did not find gender

differences in Mathematics anxiety among college students. However, Hembree's (1990) meta-analysis study revealed that, at pre-college levels, the effects of Mathematics anxiety were more pronounced in males than females. Thus, it seems that differences in Mathematics performance may be more a function of Mathematics ability and readiness than gender.

2.2.9 Mathematics Anxiety and Mathematics Learning Gains

Mathematics anxiety is prevalent among the college students population. Studies by Rahmah (1999), Ahmad (1996) and Jasmani (2005) found that a majority of Malaysian students have moderate level of Mathematics anxiety. Lazarus cited in Ma (1999) believed that the roots of Mathematics anxiety are in the elementary and secondary grades. In a similar vein, Jackson and Leffingwell (1999) have linked Mathematics anxiety to prior experience with formal instruction in Mathematics at the elementary and secondary level. They found that 16% of the students surveyed had their first negative experience with Mathematics instruction as early as grades 3 and 4. This is cause for concern, considering that matriculation students may bring these negative feelings to their university studies. A review of current research suggests that low achievers in Mathematics frequently accompany the incidence of Mathematics anxiety. Ma (1999) found that the relationship between Mathematics anxiety and Mathematics achievement is significant. It was also found that once Mathematics anxiety takes shape, its relationship with Mathematics achievement is consistent across grade levels. Satake and Amato (1995) and Hardfield et al. (1992) also reported similar findings. A high level of anxiety is associated with a lower level of achievement (Quilter & Harper, 2013). Other than achievement, Tapia (2004) reported that students having little or no Mathematics anxiety scored significantly higher in motivation than students with some or high Mathematics anxiety, and students with some Mathematics anxiety scored significantly higher than students with high Mathematics anxiety. Ma (1999) found that students who were involved in learning because wanted to be, scored significantly higher than their counterparts. They further contended that effective motivation was a predictor of Mathematics achievement. This influence is understandable since students with high motivation usually enjoy doing Mathematics, stick at problems until they are solved and become absorbed in their mathematical problem solving activities (Adejumo, Oluwole & Muraina, 2015; Wang & Ye, 2015).

Levine (1995) described Mathematics anxiety as involving feelings of anxiety and tension that interfere with doing mathematical operations. Mathematics anxiety existed around a

set of circumstances in which students suffered from fears that were based upon years of painful experiences with Mathematics (Miller & Mitchell, 1994). Mathematics anxiety has been defined as the feeling of tension, helplessness, mental disorganisation and dread one has when required to manipulate numbers and shapes and the solving of mathematical problems (Ashcraft & Faust, 1994). Fennema and Sherman cited in Ma (1999) described Mathematics anxiety as involving strong feelings of fear and apprehension when faced with the possibility of dealing with a Mathematics problem. Norwood (1994) emphasized that Mathematics anxiety did not appear to have single cause, but was, in fact, the result of many different factors such as truancy, poor self image, poor coping skills, teacher readiness and emphasis on learning Mathematics through drill without understanding.

However, Greenwood (2004) further stated that the principal cause of Mathematics anxiety has been in teaching methodologies. He said Mathematics classes did not encouraged reasoning and understanding. The problems with Mathematics anxiety would not go away until teachers applied the problem solving process to the teaching of arithmetic and Mathematics. Butterworth (1999) believes that a lack of understanding is the cause of anxiety and avoidance and that understanding based learning is more effective than drill and practice. A lack of confidence when working in mathematical situations is described by Stuart (2000) as the cause of Mathematics anxiety. Highly Mathematics anxious individuals will be less fluent in computation, less knowledgeable about Mathematics, and less likely to have discovered special strategies and relationships within the Mathematics domain (Ashcraft & Faust, 1994).

Several researchers revealed in their studies that Mathematics anxiety is negatively correlated with the performance in Mathematics, and if this issue is not dealt with properly, it could have a terrible effect in many areas of our education system. Fennema and Sherman cited in Ma (1999) using their Mathematics attitudes scales (MAS), found that Mathematics anxiety and Mathematics ability concepts were highly correlated in a sample of secondary school students. Mathematics anxiety has a highly negative relationship with Mathematics performance and achievement, which has been described in some studies (Hembree, 2009; Mevarech, Silber & Fine, 1991). Mathematics anxiety is an important factor in poor performing and achieving Mathematics (Richardson & Suinn, 2002) documented the negative effects of Mathematics anxiety on Mathematics performance and achievement. From the extensive research on co-relationship between Mathematics anxiety and students performance in Mathematics it can be

noted that the Mathematics anxiety is a crucial factor for the students' poor performances in Mathematics. If this factor is not taken into account sincerely and handled properly and effectively by the parents, educators, students themselves, schools and the policy making authorities concerned then it could have a terrible consequences for the entire education system, for instance, some major negative consequences of Mathematics anxiety are Mathematics avoidance (Hembree, 2009), the effects of Mathematics anxiety are tied to those cognitive operations that rely on the resources of working memory (Ashcraft, 2002), distress (Tobias, 1993) and interference with conceptual thinking and memory processes (Skemp, 2014).

According to Perry (2004) a Mathematics student can seriously hamper her or his performance by being nervous and insecure toward Mathematics. Most Mathematics teachers would agree that Mathematics anxiety stems primarily from students' fears of failure and feeling of inadequacy. In most cases, Mathematics anxiety is not extreme or overwhelming, yet it continues to haunt most students throughout their encounter with Mathematics (Usop et al., 2001). Mathematics anxiety could also develop as a result of a student's prior negative experiences learning Mathematics in the classroom or at home (Rosnan, 2006). A study by Vukovic, Roberts and Wright (2013) on home-school mediation analyses demonstrated that parental home support and expectations influenced students' performance and reasoning by reducing their Mathematics anxiety. Fears and anxiety about Mathematics may have more widespread consequences. If lecturers who are anxious about Mathematics are charged with teaching students Mathematics, their anxieties could have consequences for their students' Mathematics achievement.

Makari (2012) defined anxiety is a general term for several disorders that cause nervousness, fear, apprehension, and worrying. The fear of not being able to do the Mathematics or the fear that it's too hard or the fear of failure which often stems from lack of confidence. Mathematics anxiety affects how students feel and behave. It is common to experience moments of anxiety inside or outside a Mathematics class. For some students severe anxiety may lead to Mathematics phobia while for others it may lead to improved achievement. Mathematics avoidance results in less competency, exposure and Mathematics practice, leaving students more anxious and mathematically unprepared to achieve (Ashcraft, 2002). Students who have had bad experiences learning Mathematics often develop this phobia and, in turn, struggle learning various concepts because they feel they are unable to do the Mathematics.

A number of Mathematics anxiety researchers suggest that some instructional strategies for teaching Mathematics and facilitators' training, beliefs are some of the underlying causes of Mathematics anxiety (Ashcraft, 2002; Hellum, 2010). Mathematics anxiety is often due to poor teaching and poor experiences in Mathematics that typically leads to Mathematics anxiety. Russell (2008) viewed Mathematics anxiety is an emotional, rather than an intellectual problem. However, some researchers argue that Mathematics anxiety can interfere with a person's ability to learn Mathematics and therefore become an intellectual problem. Failure experiences in Mathematics and fear of future failures were also identified as the major contributing factors to Mathematics anxiety and phobia.

2.2.10 Mathematics Anxiety and Mathematics Learning Readiness

Research showed that many of the students with Mathematics anxiety have revealed an over reliance on mathematical procedures as opposed to actually understanding the Mathematics concept. When students resort to memorizing procedures, rules, and routines without much understanding, the concept is forgotten and panic sets in. Experts argue that "Mathematics anxiety" can bring about rife, intergenerational discomfort with the subject, which brings effects ranging from fewer students pursuing Mathematics and science careers to less public interest in the subject. Mathematics anxiety feels negative emotions when engaging in an activity that requires numerical or Mathematics skills (Sparks, 2011). Mathematics anxiety can become a generational problem, with adults uncomfortable with Mathematics passing negative feelings on to their children or students.

Mathematics anxiety is a real problem facing students and teachers in South African schools (Hlalele, 2012). There are many symptoms of Mathematics anxiety including unwillingness to attempt Mathematics work, class work and being unusually nervous when in Mathematics class. Mathematics anxiety hinders students' working memory (Perina, 2002). The main cause of Mathematics anxiety is the teacher himself. It has been shown that students tend to internalize their instructor's interest in and enthusiasm for teaching Mathematics (Jackson and Leffingwell, 1999). The teaching of Mathematics in South African schools is among the worst in the world (Timss, 2011). Mounting indicators on school performance and teaching reveal poor teaching of Mathematics in the great majority of schools (Bernstein, McCarthy, Oliphant, 2013). Some teachers have a bad readiness about Mathematics and their lack of confidence in their practices trigger anxiety in their students. However, the teacher can take many steps to

reduce Mathematics anxiety including reviewing basic Mathematics skills, by making sure students understand the mathematical language, and by providing a support system for their students (Schwartz, 2000).

Numerous studies indicate that Mathematics anxiety can be passed on to students through their teachers (Fiore, 1999; Wood, 2008). Zopp (1999) conducted a study with adults over 25 years old and found that specific educational episodes were sources of Mathematics anxiety. Jackson and Leffingwell (1999) found that seven percent of the participants in their study had only positive experiences in Mathematics classes from the kindergarten level through the university level. The other 93% of the participants reported negative experiences which generally occurred at certain times of grades 3 and 4 of elementary school, grades 9 through 11 of high school and the freshman year of college. At each of these levels, some participants indicated that their Mathematics anxiety was associated with insensitive and uncaring teachers. Mathematics-anxious adults include teachers, especially elementary teachers (Williams, 2008).

A disproportionate number of elementary teachers experience substantial levels of Mathematics anxiety (Buhlman & Young, 2002; Levine, 1996). Chavez and Widmer (2002) found that elementary teachers felt their own performances were acceptable in elementary school, but about half of the teachers interviewed had problems at the secondary and university levels. Sources of the problems included Mathematics content, inadequate, impatient, or sarcastic teachers, low grades (the only D in my life), and parents' impatience with lack of success in Mathematics (Chavez & Widmer, 2002). Yet, despite their negative experiences, overall, the teachers were positive about teaching Mathematics and worked diligently to spare their own students from similar unpleasant experiences with numbers.

Mathematics anxiety can involve mental and physical reactions including nausea, difficulty concentrating, blanking out, and negative self-talk (Kitchens, 1995). Ikegulu (1998) reported that students with Mathematics anxiety only take Mathematics because it is required. He indicated that students who are Mathematics anxious avoid Mathematics, fail to complete homework assignments, and have a tendency to procrastinate (Ikegulu, 2008). Mathematics anxiety is an important construct to study because it may limit the occupational and educational choices of students who perform poorly in Mathematics and/or who avoid Mathematics altogether (Betz, 2008; Hembree, 2009). Generally, positive readiness toward Mathematics is inversely related to Mathematics anxiety (Gourgey, 2004; Kincaid & Austin-Martin, 2001).

Perceptions of Mathematics as useful were negatively related to anxiety for female college students with low Mathematics anxiety but unrelated among students with high levels of anxiety (Kincaid & Austin-Martin, 2001). Multiple regression analyses revealed that among Mathematics self-concept, arithmetic skills, and beliefs about Mathematics, only Mathematics self-concept was predictive of Mathematics anxiety (Gourgey, 2004). Although Mathematics anxiety tends to be more pronounced and intense during evaluative situations, it is not limited to those situations (Betz, 2008; Ikegulu, 2008; Ikegulu, 2000). Researchers have noted that Mathematics anxiety is more encompassing than test anxiety (Bessant, 1995; Betz, 2008) as it involves a general fear of contact with Mathematics (Hembree, 2009) and can involve emotional reactions to reading, studying, thinking about, and using a wide range of Mathematics skills (Bessant, 1995).

Reys, Lindquist, Lambdin, and Smith (2007) discussed various effects of Mathematics anxiety such as misunderstandings, poor performance on Mathematics tests, uncertainty, apathy, lack of confidence, dislike of Mathematics, low motivation, and classroom behaviour problems. The effects can also include avoiding Mathematics courses, limiting one's selection of college and career choice, declining Mathematics readiness, and feeling guilty or ashamed about Mathematics (Armstrong, 2005; Betz, 2008; Adejumo, Oluwole & Muraina, 2015). Each of these or a combination can affect a student with far-reaching consequences (Newstead, 1998). The implications are clear that it is important for teachers at all levels to consider their effect on increasing or decreasing students' Mathematics anxiety. Since the first occurrences of Mathematics anxiety can often be traced to elementary school, elementary teachers in particular, should be prepared to provide positive mathematical experiences that do not cause or increase Mathematics anxiety.

2.3 Conceptual Model for the Study

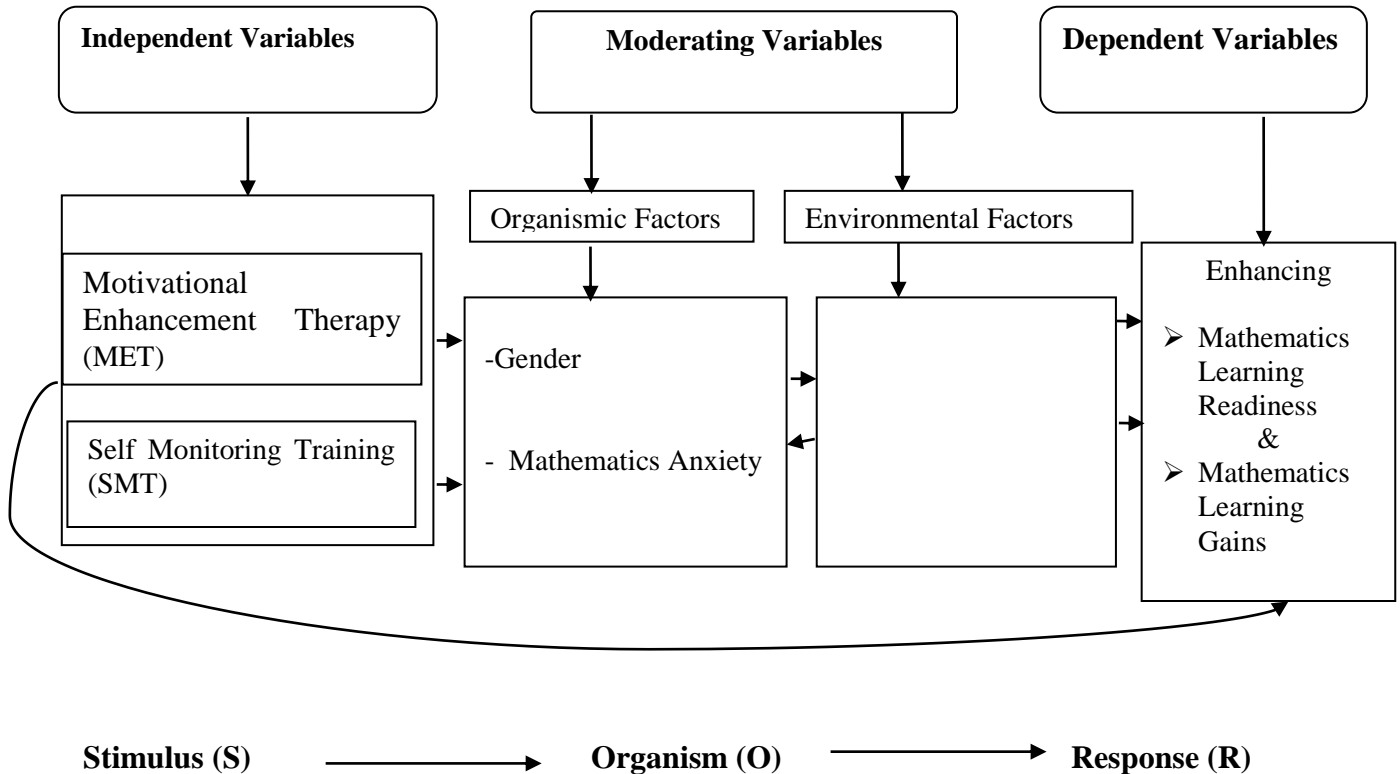


Figure 2.1: Conceptual Model for the Study

Explanation of Conceptual Model

The conceptual model for this study composed of the independent variable or the treatment packages namely; motivational enhancement therapy (MET) and self-monitoring training (SMT). These variables were manipulated by the researcher to see their effect on the dependent variables (Adolescents' Learning Readiness and Gains). The intervening or mediating variables were made up of organismic and environmental factors. The organismic factors are those factors which are resident within the individual such as gender, Mathematics anxiety, emotional intelligence, self esteem, self- efficacy, age and locus of control among others. The environmental factors are variables which are resident outside the individual and could affect the responses of the participants to the treatment package.

Examples of environmental factors are social support, availability of infrastructural Facilities, parenting style, teacher qualifications and experience among others. These variables intervene between the independent and dependent variables and when manipulated will be expected to produce measurable effects on the dependent variables which is enhancement of

adolescents' learning readiness and gains. Though several intervening variables are capable of influencing the effectiveness of the interventions in achieving enhancement of adolescents' learning readiness and gains in this study, the intervening variables of interest are gender and Mathematics anxiety. This is because literatures have shown that these have significant influence in enhancing school-going adolescents' learning readiness and gains.

2.4 Hypotheses

The following null hypotheses were formulated in this study and tested at 0.05 level of significance;

1. There is no significant main effect of treatment on students' Mathematics learning readiness
2. There is no significant main effect of gender on students' Mathematics learning readiness
3. There is no significant main effect of Mathematics anxiety on students' Mathematics learning readiness
4. There is no significant interaction effect of treatment and gender on students' Mathematics learning readiness
5. There is no significant interaction effect of treatment and Mathematics anxiety on students' Mathematics learning readiness
6. There is no significant interaction effect of gender and Mathematics anxiety on students' Mathematics learning readiness
7. There is no significant interaction effect of treatment, gender and Mathematics anxiety on students' Mathematics learning readiness
8. There is no significant main effect of treatment on students' Mathematics learning gains
9. There is no significant main effect of gender on students' Mathematics learning gains
10. There is no significant main effect of Mathematics anxiety on students' Mathematics learning gains
11. There is no significant interaction effect of treatment and gender on students' Mathematics learning gains
12. There is no significant interaction effect of treatment and Mathematics anxiety on students' Mathematics learning gains
13. There is no significant interaction effect of gender and Mathematics anxiety on students' Mathematics learning gains
14. There is no significant interaction effect of treatment, gender and Mathematics anxiety on students' Mathematics learning gains

CHAPTER THREE
METHODOLOGY

This chapter focuses on the explanation of how the study was carried out. This include the description of the research design, the study population, the sample and sampling techniques, instrumentations, procedure for data collection, summary of activities in the experimental groups and method used for data analysis.

3.1 Research Design

The study adopted pretest-posttest, control group quasi-experimental design with a 3x2x2 factorial matrix. In essence, the row consists of motivational enhancement therapy and self-monitoring skill training and the control. The row was crossed with gender varied at two levels (Male and Female) and Mathematics anxiety varied at two levels (Low and High). This is represented in the table 3.1.

Table 3.1: A 3x2x2 Factorial Matrixes for Enhancing Mathematics Learning Readiness and Gains

Treatments	GENDER				Total
	MALE (B ₁)		FEMALE (B ₂)		
	MATHEMATICS ANXIETY				
	High MA (C ₁)	Low MA (C ₂)	High MA (C ₁)	Low MA (C ₂)	
MET (A ₁)	5	6	6	13	30
SMT (A ₂)	11	7	9	3	30
CG (A ₃)	6	6	14	4	30
Total	22	19	29	20	90

Key: MA = Mathematics Anxiety, MET = Motivational Enhancement Therapy, SMT = Self-monitoring Training, CG = Control Group.

This design is schematically represented as

B1 XA1 C1

B2 XA2 C2

B3 XA3 C3

Where B1, B2 and B3 are pre-tests

C1, C2 and C3 are post-tests

XA1 = Experimental treatment of Motivational Enhancement therapy

XA2 = Experimental treatment of Self-monitoring Training.

XA3 = No treatment was given to the control group

3.2 Population

The population for the study comprised all school-going adolescents in public secondary schools in Saki educational zone of Oyo State, Nigeria. This educational zone was selected as a result of their being sidelined in term of provision of basic amenities, qualified teachers, provision of teaching and learning materials and poor rural development among others. The researcher covered all school-going adolescents in JSS 2 in ten (10) Local Governments that constitute Saki educational zone of Oyo State, Nigeria. As at 2015, records from Oyo State Ministry of Education showed that there were one hundred and fourteen (114) public secondary schools with eleven thousand nine hundred and forty nine (11,949) school-going adolescents in JSS 2. The table 3.2 also gave clear information on the population based on the Local Governments and number of schools in selected zone.

Table 3.2: Local Governments with Numbers of Secondary Schools and the Respective JSS 2 Students in Saki Educational Zones of Oyo state, Nigeria

S/N	Local Government Names	Number of Schools	Number of JSS 2 Students
1.	Saki East	10	687
2.	Saki West	16	2,592
3.	Atisbo	10	731
4.	Iseyin	25	2,766
5.	Kajola	17	1,794
6.	Itesiwaju	10	669
7.	Olorunsogo	4	521
8.	Irepo	6	606
9.	Iwajowa	9	926
10.	Orelope	7	657
	Total	114	11,949

Source: Tescom Oyo State, 2015

As shown in the table 3.2, Oyo state has four educational zones namely Ibadan/Ibarapa zone, Oyo zone, Ogbomosho zone and Saki zone with thirty three (33) Local Government Areas. Ibadan/Ibarapa zone has fourteen (14) Local Government Areas, Oyo zone has four (4) Local Government Areas, Ogbomosho zone has five (5) Local Government Areas and Saki zone has ten (10) Local Government Areas. The table 3 showed clearly that there are one hundred

and fourteen (114) public secondary schools with eleven thousand nine hundred and forty nine (11,949) school-going adolescents in JSS 2.

3.4 Sample and Sampling Technique

Multi-stage sampling technique was used to select the participants for the study. The first stage involves the use of purposive sampling in selecting Saki educational zone out of four (4) available zones in Oyo State. The second stage witnessed random selection of three (3) Local Government Areas (that is Itesiwaju, Atisbo and Saki West Local Governments) from Saki educational Zone out of ten (10) Local Government Areas in the Zone. However, the third stage deals with the selection of one (1) public secondary school randomly in each selected Local Government Areas in the Zone; and lastly thirty (30) JSS 2 students with low Mathematics learning readiness and gains were purposively selected in each public secondary school. On the whole, ninety (90) school-going adolescents were drawn from the three selected public secondary schools in the Saki Zone of Oyo State, Nigeria. The participants consisted of school-going adolescents in JSS 2 who had consistent records of low Mathematics achievement and scored low in the screening instrument. However, in the three selected public secondary schools, one school formed motivational enhancement therapy class; the second school formed self- monitoring skill training class and the remaining one served as control group.

The schools selected were Muslim Grammar School, Otu (MGSO) in Itesiwaju Local Government, Baptist Secondary Grammar School, Ago-Are (BASEGA) in Atisbo Local Government and Baptist High School, Saki (BHS) in Saki West Local Government. However, 62.2% of the respondents were below 15 years old, 34.4% were between 16 – 20 years and 3.3% were above 21 years old; 45.6% were Male while only 54.4% were Female and 43.3% have low Mathematics Anxiety while 56.7% have high Mathematics Anxiety.

3.5 Research Instruments

Mathematics Learning Readiness Scale (MLRS)

This scale consists of a twenty four (24) item instrument rated on four points type scale ranging from strongly agreed (SA) to strongly disagreed (SD). The instrument was adapted from learning readiness scale developed by Bernard and John (2003). Example of the items in the scale was: *1. I love learning Mathematics always; 2. Learning Mathematics is frustrating to me; 3. The hours I spend doing Mathematics are the ones I enjoy most.* The instrument has

reliability coefficient of .89. The points that were scored on all items were summed up to give participants' score on the scale. The scores ranged from 24 to 96. However, the instrument was re-validated by the researcher and Cronbach alpha of .83 was obtained in a pilot study which involved an administration of the instrument to a selected sample of thirty (30) JSS 2 students in Osogbo, Osun State, Nigeria.

Mathematics Anxiety Scale (MAS)

This scale consists of fourteen (14) item instrument rated on four points type scale ranging from strongly agreed (SA) to strongly disagreed (SD). The instrument was adopted from Mathematics anxiety scale developed by Mahmood and Khatoon (2011). Example of the items in the scale was: *1. Mathematics makes me feel comfortable and easy; 2. I feel worried before entering the Mathematics class; 3. Solving Mathematics problems is always pleasant for me.* The instrument has reliability coefficient of .89 with Cronbach's Alpha of .87. The points that were scored on all items were summed up to give participants' score on the scale. Also, positively structured items were reversed accordingly and the scores were assigned based on the options picked by the participants (i.e SA = 4 to SD = 1). Participants below 28 scores were categorized as low Mathematics anxiety students while those above 28 scores were classified as high Mathematics anxiety students. The instrument was however re-validated and Cronbach alpha value of .88 was obtained after administering the instrument in a pilot study to a selected sample of thirty (30) JSS 2 students in Osogbo, Osun State, Nigeria.

Attitude to Mathematics Scale (AMS)

Attitude to Mathematics scale consist of twenty (20) item instrument rated on four points type scale ranging from strongly agreed (SA) to strongly disagreed (SD). The instrument was adapted from attitude to Mathematics scale developed by Akinsola (1994). The adapted and modified instrument contains 30 items validated through a pilot study. Example of the items in the scale was: *1. Sometimes I think Mathematics assignment is easy when other students think it is hard; 2. I am one of the best students in my class; 3. I love to be solving mathematical problems.* The instrument has reliability coefficient of .77. The instrument was however re-validated and Cronbach alpha value of .83 was obtained after administering the instruments in a pilot study to a selected sample of thirty (30) JSS 2 students in Osogbo, Osun State, Nigeria. The items in the scale were scored as follows: Strongly Agree = 4, Agree = 3, Disagree = 2 and Strongly Disagree = 1. The points that were scored on all items were summed

up to give participant's score on the scale. Scores on the scale ranged between 20 and 80. A score above 40 indicated high Mathematics readiness and score below 40 indicated low Mathematics learning readiness and school-going adolescents with low Mathematics learning readiness and gains were used.

In addition to this, all schools operate a common policy of conducting two continuous assessment tests each term of the session totaling six (6) continuous assessment scores. All schools also conduct the end-of-term examination making up three examinations. The two continuous assessment scores have a weight of 40% while the terminal examination has a weight of 60% totaling 100% for each candidate in every subject offered. At the end of the session, the average of the three terms scores are computed for each student to determine suitability for promotion. This practice of cumulating and averaging offers a consistent picture of each student's academic status as to whether he/she is high, average or low in the subject. Accordingly, subject grade in all the schools is based on the number of percentage passed in the subject thus: 75 and above = A; 70 – 74 = B; 60 – 69 = C; 50 – 59 = D; 40 – 49 = E and Below 39 = F. Participants for this study would be selected from categories E to F.

Mathematics Learning Gains Test (MLGT)

This was made up of thirty one (31) multiple choice items with four options (A-D). All the questions were answered by the participants within an hour. The reliability coefficient of the instrument was determined using Kuder – Richardson formula 20 (KR20). Kuder – Richardson formula 20 (KR20) was used to determine the internal consistency and overall coefficient of the instrument. Item analysis was also used to carry out the difficulty index and discriminatory power of the test. This was done between the higher achievers and lower achievers in Mathematic. The difficulty and discriminating indices of each of the test items was computed for further validation of the instrument. The difficulty level of .48 to .55 and the discrimination index of .71 to .79 were obtained.

However, Writing of test items was followed by face and content validation. The face and content validation reduced the items from sixty (60) to forty five (45) after subjecting the test to thorough screening among three (3) Mathematics teachers in secondary schools; while item analysis further reduced the test items from forty five (45) to thirty one (31). The surviving items were administered on thirty students. Kuder-Richardson formula (KR) was applied to the scores in order to measure the internal consistency. Example of the items in the Test include: 1. Simplify $(-8) \times (-3)$? 2. Solve for x in $x^2 - 5x = 6$?; 3. Find the value of x if $4x + 7 = 5x + 6$? The

internal consistency coefficient of .79 was obtained and this showed that the test is reliable to be used for the study. However, to construct MLG, table of specification (or test blueprint) was drawn up for sixty (60) test items as shown in table 3.3 and the survival items were also distributed on the table of specification as demonstrated in table 3.4:

Table 3.3: Table of Specifications for MLG

S/N	Mathematics Areas	Recall	Understanding	Application	Total
1.	Indices and standard form	7, 2, 15, 5 (4)	9, 11, 18, 20, 30 (5)	12, 27, 19, 23, 31, 41 (6)	15
2.	Approximations	1, 29 (2)	49, 51, 6 (3)	55, 43, 24, 42 (4)	9
3.	Simple Equations	32, 37, 39, 46, 50 (5)	57, 14, 17, 48, 52, 22 (6)	3, 4, 54 (3)	14
4.	Plane and solid shapes	53, 40 (2)	44, 13, 38, 16, 47 (5)	34, 60, 8, 36 (4)	11
5.	Algebraic Expression	21, 33, 10, 28, 35 (5)	59, 26, 54 (3)	56, 45, 25 (3)	11
	TOTAL	18	22	20	60

Source: Researcher's Field Work

However, the MLG was tailored on the lower level of cognitive domain (i.e Recall, Understanding and Application), simply because the researcher is concentrating on the lower secondary school classes and as such the higher levels (i.e Analysis, Synthesis and Evaluation) is more of Further Mathematics and this Further Mathematics is subject that is made optional/elective only for the science students in the Senior Secondary School (SSS) class. Each objective questions carry 2 marks, question 1 & 2 of the theory carry 12 marks while question 3 carry 14 marks (i & ii 4 marks each and iii & iv 3 marks each). Hence objectives questions carry 62 marks while theory parts carry 38 marks in all. The participants' scores ranged from 0 to 100.

Table 3.4: Survival Items Distribution of MLG in the Table of Specifications

S/N	Mathematics Areas	Recall	Understanding	Application	Total
1.	Indices and standard form	17, 22, 29	19, 20, 26	18, 21, 23	9
2.	Approximations	8, 25	9, 15	10, 13	6
3.	Simple Equations	2, 3	7	11, 24	5
4.	Plane and solid shapes	12	28	14, 16	4
5.	Algebraic Expression	1, 27	5, 4, 31	6, 30	7
	TOTAL	10	10	11	31

Source: Researcher's Field Work

Inclusion Criteria

The following criteria were used in selecting the participants for the study:

- i. Interested participants should be JSS 2 school-going adolescents

- ii. Adolescents with consent from their parents
- iii. Adolescents with consent from the school authority
- iv. Adolescents willing to participate in the treatment programme.
- v. Adolescents with low score in the attitude to Mathematics scale for screening
- vi. Adolescents with consistent record of low learning gains in Mathematics

Exclusion Criteria

- i. Participants' non readiness to sign consent form.

3.6 Procedure for Data Collection

The study was carried out in four phases: pre-session activities, pre-test, treatment and post-test. At the pre-session, activities include the screening, recruitment and assignment of participants to the two experimental and control group. Advertisement was made to request for participants in selected secondary schools. A preliminary meeting was organised to familiarise with the interested participants and to solicit their willingness to participate in the study. At the pre-test stage Mathematics Anxiety Scale (MAS), Mathematics Learning Readiness Scale (MLRS) and Mathematics Learning Gains Test (MLGT) were administered to the participants. Participants in the two experimental groups only were exposed to eight sessions of treatment (motivational enhancement therapy and self-monitoring skill trainings). Each session spanned for an average of 80 minutes equivalent to one hour and twenty Minutes (1 Hour 20 Minutes). Though the control group was not treated, they were exposed to a lecture titled "*Education and Sustainable Development*". The post-test was administered following the conclusion of the programme.

The Synopsis of Treatment Packages was given below:

Experimental Group 1 (Motivational Enhancement Therapy)

1st Session: General orientation and administration of the instrument to obtain pre-test scores.

2nd Session: This session focused on issues of Mathematics learning readiness and gains; and the components of motivational enhancement therapy which entails the premise for students to achieve change when motivation comes from within themselves rather than being imposed by the therapist.

3rd Session: This deals with the explanations of learning environmental mastery which deals with the ability of student to have a sense of mastery and competence in managing the learning environment and able to create or choose contexts suitable to personal learning needs and values.

4th Session: In this session, an attempt was made to explain the personal growth citing example the students will have a feeling of continued developmental trend; see themselves as growing and expanding and open to new learning experiences for learning Mathematics.

5th Session: The session focused on urge and motive. Using the structure of motivational enhancement therapy identified above, the researcher explained that student who has urge and motive is an individual who is self-determined to learn irrespective of the conditions/situation; able to resist to solving problems; regulates behaviour from within and evaluates self by personal acceptance.

6th Session: This session was on the meaning and strategies of developing discrepancy, stating clearly that such students who develop discrepancy; accepts his/her good and bad qualities; feels positive about past life in learning will have an improved Mathematics learning readiness and gains.

7th Session: During this session, the researcher defined the relationship and explained self-efficacy support with respect to how it could affect or influence their Mathematics learning readiness and gains. This MET strategy refers to helping develop and support the client's belief that he/she can achieve change in learning Mathematics.

8th Session: The session witnessed summary of motivational enhancement therapy, collection of post-test scores and formal closing of the sessions.

Experimental Group 2: (Self-monitoring Skill Training)

1st Session: General orientation and administration of the instrument to obtain pre-test scores.

2nd Session: This session focused on defining the issues and problems of Mathematics learning readiness and gains; and self-monitoring training (SMT) as two-stage process that involves observing and recording.

3rd Session: In this session, the researcher explained the processes of self-monitoring. The processes which are self-control, self-observation, task analysis, self-motivation beliefs, self-judgment, self-reaction, time management and organisation among others and explain the importance of each processes in enhancing Mathematics learning readiness and gains.

4th Session: Here, the researcher focused on widening the perspectives of participants through task analysis which involves goal setting and strategic planning for learning Mathematics.

5th Session: The session was based on explanation of time management and organisation. At this session, the researcher emphasised on process of planning and exercising conscious control

over the amount of time spent on specific activities especially to increase effectiveness, efficiency or productivity of students toward learning Mathematics.

6th Session: In this session, the researcher explained self-reflection in line with Mathematics learning readiness and gains. Here the respondents were able to involve in self-judgment and self-reaction. Self-reaction refers to comparison of self-observed performances against some standards and self-reflection which is self-judgment involves the beliefs about the cause of one's errors or successes.

7th Session: This session comprised of behaviour modification and follow-up interventions. This encouraged the respondents to set up realistic and achievable goals rather than unrealistic ones.

8th Session: The session witnessed the summary of self-monitoring skill training, collection of post-test scores and formal closing of the sessions.

Control Group

Session 1: Introduction and pre-treatment

Session 2: Education and Sustainable Development

Session 3: Post testing and conclusion

3.7 Control of Extraneous Variables

Extraneous variables are those factors or attributes that may affect the outcome of the experimental study aside from the skill trainings to be employed. The researcher guided against effects of such variables through the following; appropriate randomisation of participants into the two intervention groups and the control group; adherence to inclusion criteria; effective use of the 3x2x2 factorial matrix design and the Analysis of Covariance (ANCOVA) statistical tool that was used equally takes care of likely extraneous variables.

3.8 Data Analysis

Simple percentage and Analysis of Covariance (ANCOVA) are the major statistical tools that were employed in this study. Simple percentage was used to analyse the demographic characteristics of the respondents while ANCOVA was used to establish initial differences between the participants in the experimental and control groups. The Duncan Post-hoc and Multiple Classification Analysis were also used in this study to determine the directions of differences and significance identified.

CHAPTER FOUR

RESULTS

This chapter presents the results and summary of findings. The study investigated the effects of motivational enhancement therapy and self-monitoring skill training on Mathematics learning readiness and gains among school-going adolescents in Oyo State, Nigeria. Fourteen (14) null hypotheses were formulated and tested at 0.05 level of significance. The data were analyzed using simple percentage and Analysis of Covariance (ANCOVA) statistical method. The results are presented as follow:

4.1 Analysis of Demographic Characteristics of Respondents

Table 4.1: Distribution of Respondents based on Age

Age	Frequency	Percent	Cumulative Percent
Below 15 Years	56	62.2	62.2
16-20 Years	31	34.4	96.7
Above 21 Years	3	3.3	100.0
Total	90	100.0	

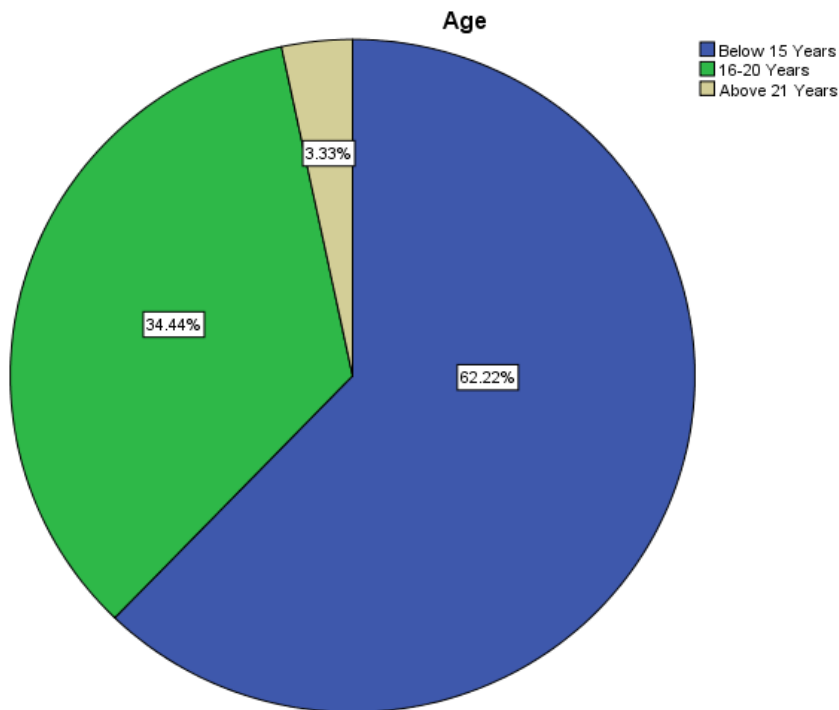


Figure 4.1: Distribution of Respondents based on Age

Table 4.1 and figure 4.1 showed that 62.2% of the respondents were below 15 years old, 34.4% were between 16 – 20 years and 3.3% were above 21 years old.

Table 4.2: Distribution of Respondents based on Gender

Gender	Frequency	Percent	Cumulative Percent
Male	41	45.6	45.6
Female	49	54.4	100.0
Total	90	100.0	

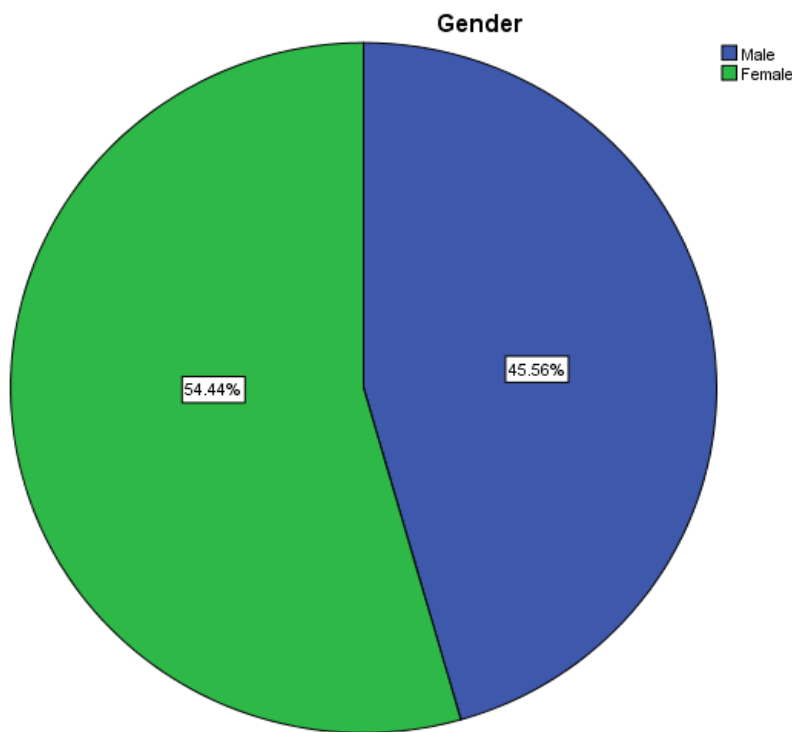


Figure 4.2: Distribution of Respondents based on Gender

Table 4.2 and figure 4.2 revealed that 45.6% of the respondents were Male while only 54.4% were Female.

Table 4.3: Distribution of Respondents based on Mathematics Anxiety

Mathematics Anxiety	Frequency	Percent	Cumulative Percent
Low Mathematics Anxiety	39	43.3	43.3
High Mathematics Anxiety	51	56.7	100.0
Total	90	100.0	

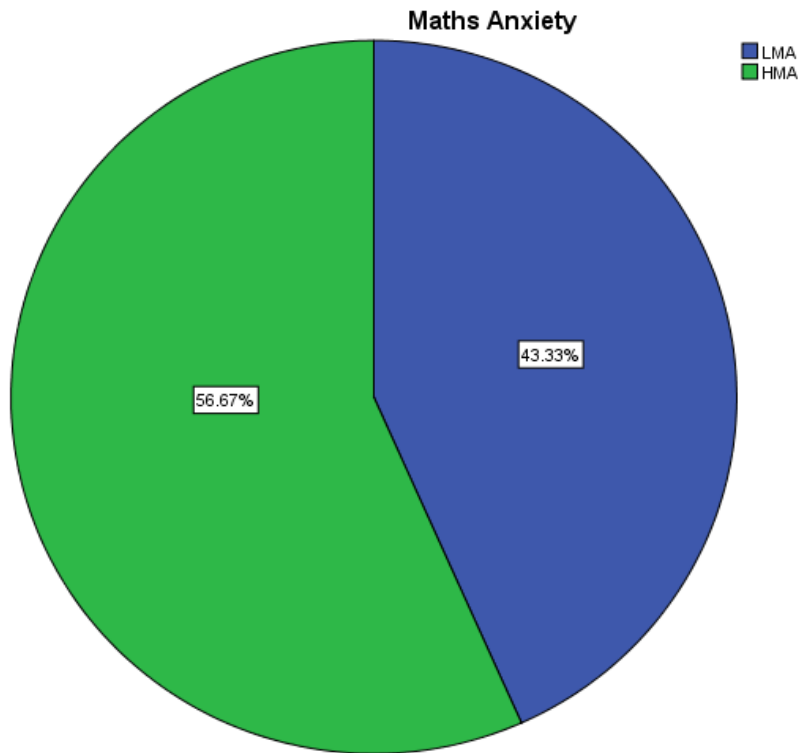


Figure 4.3: Distribution of Respondents based on Mathematics Anxiety

The table 4.3 and figure 4.3 revealed that 43.3% of the respondents have low Mathematics Anxiety while 56.7% have high Mathematics Anxiety.

Table 4.4: Distribution of Respondents based on Experimental and Control Group

Experimental/Control Group	Frequency	Percent	Cumulative Percent
Motivational Enhancement Therapy	30	33.3	33.3
Self-Monitoring Skill Training	30	33.3	66.7
Control Group.	30	33.3	100.0
Total	90	100.0	

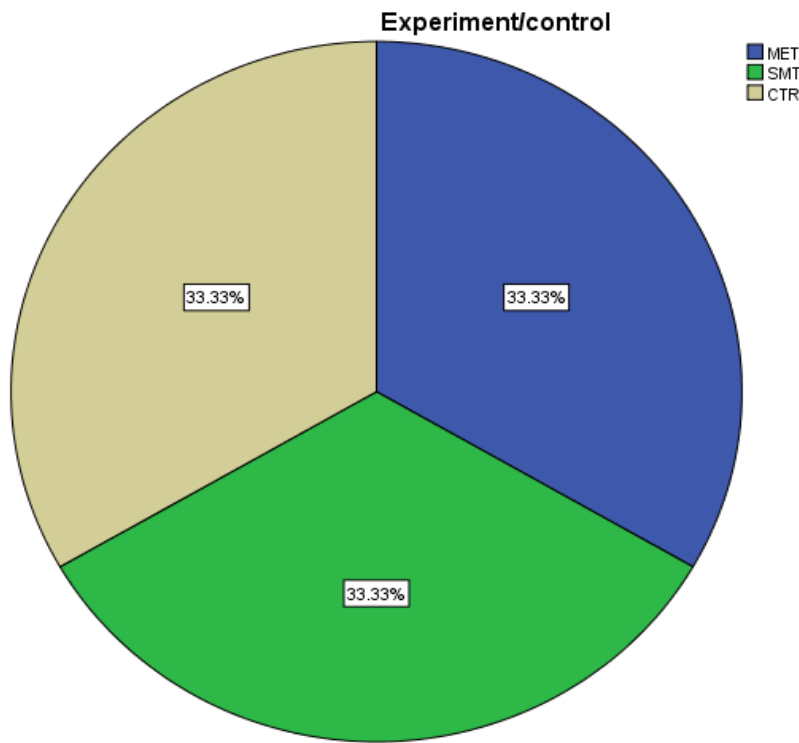


Figure 4.4: Distribution of Respondents based on Experimental and Control Group

The table 4.4 and figure 4.4 indicated that 33.3% of the respondents fall in the Experimental group of Motivational Enhancement Therapy and Self-Monitoring Skill Training as well as that of Control Group.

4.2 Answering of Hypotheses

Hypothesis One: There is no significant main effect of treatment on students' Mathematics learning readiness

Table 4.5a: Summary of 3x2x2 Analysis of Covariance (ANCOVA) showing the significant main and interactive effect of Treatment Groups, Gender and Mathematics Anxiety among School-going Adolescents

Source	Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Remark
Corrected Model	27200.654 ^a	12	2266.721	16.454	.000	.719	
Intercept	2604.193	1	2604.193	18.904	.000	.197	
Prescore	356.290	1	356.290	2.586	.112	.032	
Main Effect							
Treatment	17679.999	2	8840.000	64.171	.000	.625	S
Gender	86.068	1	86.068	.625	.432	.008	NS
Maths anxiety	2599.664	1	2599.664	18.871	.000	.197	S
2-Way Interaction							
Treatment x Gender	112.070	2	56.035	.407	.667	.010	NS
Treatment x Maths anxiety	1162.973	2	581.486	4.221	.018	.099	S
Gender x Maths anxiety	402.697	1	402.697	2.923	.091	.037	NS
3-Way Interaction							
Treatment x Gender x Maths anxiety	313.044	2	156.522	1.136	.326	.029	NS
Error	10607.346	77	137.758				
Total	383768.000	90					
Corrected Total	37808.000	89					

(R Squared = .719, Adjusted R Squared = .676)

*Significant at 0.05

The table 4.5a showed that there was significant main effect of treatment on students' Mathematics learning readiness ($F_{(2, 77)} = 64.171$, $p < .05$, $\eta^2 = .625$). This implies that there is a significant impact of the treatment in the groups test scores on Mathematics learning readiness of school-going adolescents. Therefore, the null hypothesis which stated that there is no

significant main effect of treatment on students' Mathematics learning readiness was rejected; the table 4.5a also shows the contributing effect size of 62.5%. For further clarification on the margin of differences between the treatment groups and the control group, a Duncan post-hoc pairwise analysis which shows the comparison of the adjusted mean was computed and the result is as shown in the table 4.5b.

Table 4.5b: Duncan Post-hoc Pairwise Analysis showing the significant differences among various Treatment Groups and the Control Group in Mathematics Learning Readiness

Treatments Groups	N	Subset for alpha = 0.05	
		1	2
Control	30	39.6667	
Motivational Enhancement Therapy	30		75.2333
Self-Monitoring Skill Training	30		71.1000
Significant		1.000	.481

From the table 4.5b, it revealed that experimental group I (Motivational Enhancement Therapy) ($\bar{x} = 75.23$) has the highest mean than the experimental group II (Self-monitoring Skill Training) ($\bar{x} = 71.10$) and control group ($\bar{x} = 39.67$). By implication, motivational enhancement therapy is more potent in enhancing Mathematics learning readiness among school-going adolescents than self-monitoring skill training. The coefficient of determination (Adjusted $R^2 = .676$) overall indicates that the differences that exist in the group account for 67.6% in the variation of students' Mathematics learning readiness. In order to obtain further information on the performance of each group, a Multiple Classification Analysis (MCA) was computed and the result is presented in Table 4.5c.

Table 4.5c: Multiple Classification Analysis (MCA) showing the direction of the differences of the treatment Groups, gender and Mathematics Anxiety in Mathematics Learning Readiness of School-going Adolescents

Variable + Category	N	Unadjusted Deviation	Eta	Adjusted Deviation	Beta
Grand Mean = 62.0					
<i>Treatment:</i>					
MET	30	13.23		10.78	
SMT	30	9.10		10.52	
Control	30	-22.33	.775	-21.31	.735
<i>Gender:</i>					
Male	41	.54		-1.08	
Females	49	-.45	.024	.91	.048
<i>Mathematics Anxiety:</i>					
Low	39	8.87		6.45	
High	51	-6.78	.379	-4.93	.275
Multiple R Squared	.670				
Multiple R	.818				

In table 4.5c, the mean scores of the different treatment and control groups are: Motivational enhancement therapy (Grand Mean $(62.0 + 13.23) = 75.23$; self-monitoring skill training (Grand Mean $(62.0 + 9.10) = 71.10$ and Control (Grand Mean $(62.0 - 22.33) = 39.67$ respectively. Also, the mean scores of gender differences are: Male (Grand Mean $(62.0 + .54) = 62.54$ and Female (Grand Mean $(62.0 - 0.45) = 61.55$ respectively. And the mean scores of different Mathematics Anxiety category: Low Mathematics Anxiety (Grand Mean $(62.0 + 8.87) = 70.87$ and High Mathematics Anxiety (Grand Mean $(62.0 - 6.78) = 55.22$ respectively.

From the arithmetic given, motivational enhancement therapy ranked highest (Grand Mean = 75.23), followed by self-monitoring skill training (Grand Mean = 71.10) and the control group (Grand Mean = 39.67). This indicates that motivational enhancement therapy is more effective in enhancing Mathematics learning readiness among students.

Hypothesis Two: There is no significant main effect of gender on students' Mathematics learning readiness

Table 4.5a showed that there was no significant main effect of gender on students' Mathematics learning readiness ($F_{(1, 77)} = .625, p > .05, \eta^2 = .008$). Hence, the null hypothesis was accepted. This denotes that there is no significant difference in the Mathematics learning readiness of male and female students. Table 4.5c further revealed that the mean score of male students (estimated mean = 62.54) while that of female (estimated mean = 61.55). The male has slightly higher Mathematics learning readiness compared to their female counterpart but the difference was not significant.

Hypothesis Three: There is no significant main effect of Mathematics anxiety on students' Mathematics learning readiness

Table 4.5a demonstrated that there was main effect of Mathematics anxiety on students' Mathematics learning readiness ($F_{(1, 77)} = 18.871, p < .05, \eta^2 = .197$). Therefore, the null hypothesis was rejected. The MCA on Table 4.5c further indicates that the mean score of students with low Mathematics anxiety (estimated mean = 70.87) while high Mathematics anxiety (estimated mean = 55.22). This implies that students with low Mathematics anxiety have high Mathematics learning readiness more than their counterpart with high Mathematics anxiety.

Hypothesis Four: There is no significant interaction effect of treatment and gender on students' Mathematics learning readiness

Table 4.5a showed that there was no significant interaction effect of treatment and gender on students' Mathematics learning readiness ($F_{(2, 77)} = .407, p > .05, \eta^2 = .010$). Hence, the null hypothesis was accepted. This demonstrates that gender did not significantly moderate the efficiency of the treatment in enhancing students' Mathematics learning readiness.

Hypothesis Five: There is no significant interaction effect of treatment and Mathematics anxiety on students' Mathematics learning readiness

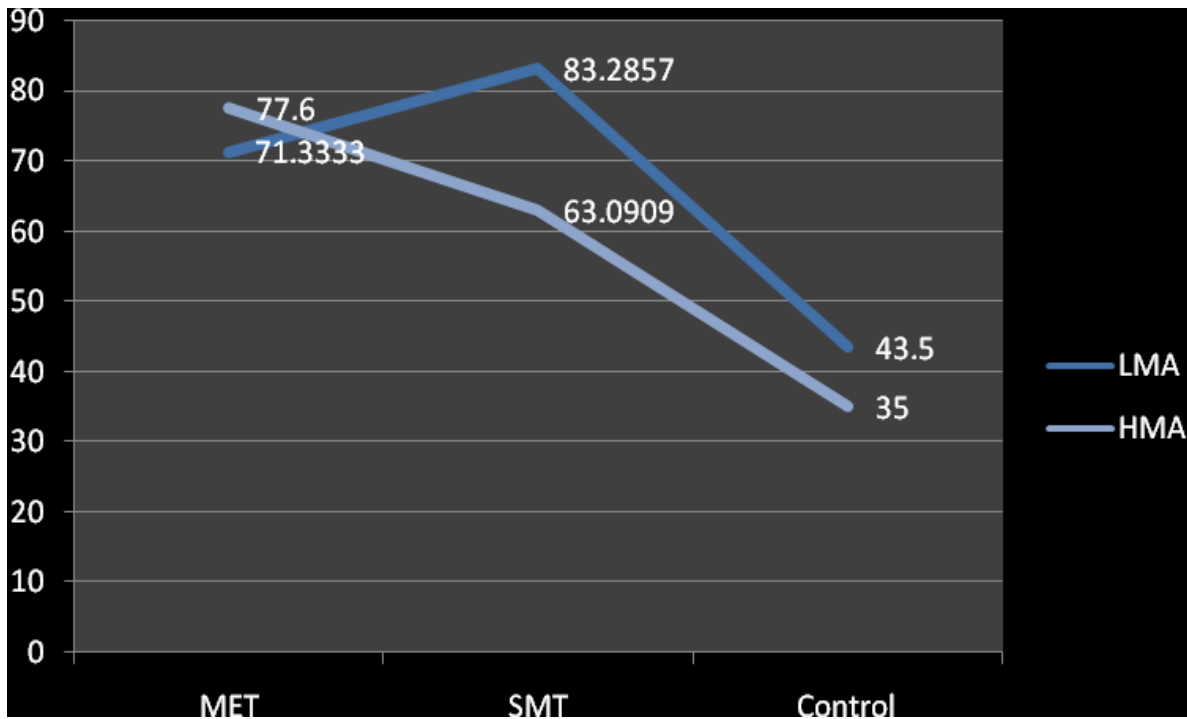


Figure 4.5: Interaction effect of treatment and Mathematics Anxiety on students' Mathematics learning readiness

The result in Table 4.5a and figure 4.5 indicated that there was significant interaction effect of treatment and Mathematics anxiety on students' Mathematics learning readiness ($F_{(2, 77)} = 4.221, p < .05, \eta^2 = .099$). Therefore, the null hypothesis was rejected. This implies that Mathematics anxiety influence the effectiveness of treatment in enhancing students' Mathematics learning readiness.

Hypothesis Six: There is no significant interaction effect of gender and Mathematics anxiety on students' Mathematics learning readiness

The result in Table 4.5a revealed that there was no significant interaction effect of gender and Mathematics anxiety on students' Mathematics learning readiness ($F_{(1, 77)} = 2.923, p > .05, \eta^2 = .037$). Therefore, the null hypothesis was accepted. This means that gender and Mathematics anxiety did not significantly enhance the Mathematics learning readiness of students.

Hypothesis Seven: There is no significant interaction effect of treatment, gender and Mathematics anxiety on students' Mathematics learning readiness

Table 4.5a indicated that there was no significant interaction effect of treatment, gender and Mathematics anxiety on students' Mathematics learning readiness ($F_{(2, 77)} = 1.136, p > .05, \eta^2 = .029$). By implication, the null hypothesis was accepted. This denotes that the impact of the treatment, gender and Mathematics anxiety in enhancing students' Mathematics learning readiness was not significant.

Hypothesis Eight: There is no significant main effect of treatment on students' Mathematics learning gains

Table 4.6a: Summary of 3x2x2 Analysis of Covariance (ANCOVA) showing the significant main and interactive effect of Treatment Groups, Gender and Mathematics Anxiety among School-going Adolescents

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Remark
Corrected Model	41175.214 ^a	12	3431.268	26.260	.000	.804	
Intercept	10038.719	1	10038.719	76.828	.000	.499	
Prescore	768.296	1	768.296	5.880	.018	.071	
Main Effect							
Treatment	21487.486	2	10743.743	82.224	.000	.681	S
Gender	17.327	1	17.327	.133	.717	.002	NS
Maths anxiety	4089.652	1	4089.652	31.299	.000	.289	S
2-Way Interaction							
Treatment * Gender	11.517	2	5.759	.044	.957	.001	NS
Treatment * Maths anxiety	2055.629	2	1027.814	7.866	.001	.170	S
Gender * Maths anxiety	10.541	1	10.541	.081	.777	.001	NS
3-Way Interaction							
Treatment * Gender * Maths anxiety	15.588	2	7.794	.060	.942	.002	NS
Error	10061.186	77	130.665				
Total	275038.000	90					
Corrected Total	51236.400	89					

(R Squared = .804, Adjusted R Squared = .773)

**Significant at 0.05*

The table 4.6a demonstrated that there was significant main effect of treatment on students' Mathematics learning gains ($F_{(2, 77)} = 82.224, p < .05, \eta^2 = .681$). This implies that there is a significant impact of the treatment in the groups test scores on Mathematics learning gains of school-going adolescents. Therefore, the null hypothesis stated that there is no significant main effect of treatment on students' Mathematics learning gains was rejected; the table 4.6a also shows the contributing effect size of 68.1%. For further clarification on the margin of differences between the treatment groups and the control group, a Duncan post-hoc pairwise analysis which shows the comparison of the adjusted mean was computed and the result is as shown in the table 4.6b.

Table 4.6b: Duncan Post-hoc Pairwise Analysis showing the significant differences among various Treatment Groups and the Control Group in Mathematics Learning Gains

Treatments Groups	N	Subset for alpha = 0.05	
		1	2
Control	30	22.7333	
Motivational Enhancement Therapy	30		66.1000
Self-monitoring Skill Training	30		60.7667
Significant		1.000	.354

From the table 4.6b, it revealed that experimental group I (Motivational Enhancement Therapy) ($\bar{x} = 66.10$) has the highest mean than the experimental group II (Self-monitoring Skill Training) ($\bar{x} = 60.77$) and control group ($\bar{x} = 22.73$). By implication, motivational enhancement therapy is more potent in enhancing Mathematics learning gains among school-going adolescents than self-monitoring skill training. The coefficient of determination (Adjusted $R^2 = .773$) overall indicates that the differences that exist in the group account for 77.3% in the variation of students' Mathematics learning gains. In order to obtain further information on the performance of each group, a Multiple Classification Analysis (MCA) was computed and the result is presented in Table 4.6c.

Table 4.6c: Multiple Classification Analysis (MCA) showing the direction of the differences of the treatment Groups, gender and Mathematics Anxiety in Mathematics Learning Gains of School-going Adolescents

Variable + Category Grand Mean = 49.87	N	Unadjusted Deviation	Eta	Adjusted Deviation	Beta
<i>Treatment:</i>					
MET	30	16.23		13.22	
SMT	30	10.90		12.38	
Control	30	-27.14	.809	-25.60	.759
<i>Gender:</i>					
Male	41	2.11		.16	
Female	49	-1.76	.081	-.14	.006
<i>Mathematics Anxiety:</i>					
Low	39	11.67		8.61	
High	51	-8.93	.428	-6.59	.316
Multiple R Squared	.747				
Multiple R	.864				

From table 4.6c, the mean scores of the different treatment and control groups are: motivational enhancement therapy (Grand Mean $(49.87 + 16.23) = 66.10$; self-monitoring skill training (Grand Mean $(49.87 + 10.90) = 60.77$ and Control (Grand Mean $(49.87 - 27.14) = 22.73$ respectively. Also, the mean scores of gender differences are: Male (Grand Mean $(49.87 + 2.11) = 51.98$ and Female (Grand Mean $(49.87 - 1.76) = 48.11$ respectively. And the mean scores of different Mathematics Anxiety category: Low Mathematics Anxiety (Grand Mean $(49.87 + 11.67) = 61.54$ and High Mathematics Anxiety (Grand Mean $(49.87 - 8.93) = 40.94$ respectively.

From the arithmetic in table 4.6c, motivational enhancement therapy ranked highest (Grand Mean = 66.10), followed by self-monitoring skill training (Grand Mean = 60.77) and the control group (Grand Mean = 22.74). This indicates that motivational enhancement therapy is more effective in enhancing Mathematics learning gains among students.

Hypothesis Nine: There is no significant main effect of gender on students' Mathematics learning gains

Table 4.6a shows that there was no significant main effect of gender on students' Mathematics learning gains ($F_{(1, 77)} = .133, p > .05, \eta^2 = .002$). Hence, the null hypothesis was accepted. This denotes that there is no significant difference in the Mathematics learning gains of male and female students. Table 4.6a further revealed that the mean score of male students (estimated mean = 51.98) while that of female (estimated mean = 48.11). The male has slightly higher Mathematics learning gains compared to their female counterpart but the difference was not significant.

Hypothesis Ten: There is no significant main effect of Mathematics anxiety on students' Mathematics learning gains

Table 4.6a showed that there was main effect of Mathematics anxiety on students' Mathematics learning gains ($F_{(1, 77)} = 31.299, p < .05, \eta^2 = .289$). Therefore, the null hypothesis was rejected. The MCA on Table 4.6a further indicates that the mean score of students with low Mathematics anxiety (estimated mean = 61.54) while high Mathematics anxiety (estimated mean = 40.94). This implies that students with low Mathematics anxiety have high Mathematics learning gains more than their counterpart with high Mathematics anxiety.

Hypothesis Eleven: There is no significant interaction effect of treatment and gender on students' Mathematics learning gains

Table 4.6a showed that there was no significant interaction effect of treatment and gender on students' Mathematics learning gains ($F_{(2, 77)} = .044, p > .05, \eta^2 = .001$). Hence, the null hypothesis was accepted. This demonstrates that gender did not significantly moderate the effectiveness of the treatment in enhancing students' Mathematics learning gains.

Hypothesis Twelve: There is no significant interaction effect of treatment and Mathematics anxiety on students' Mathematics learning gains

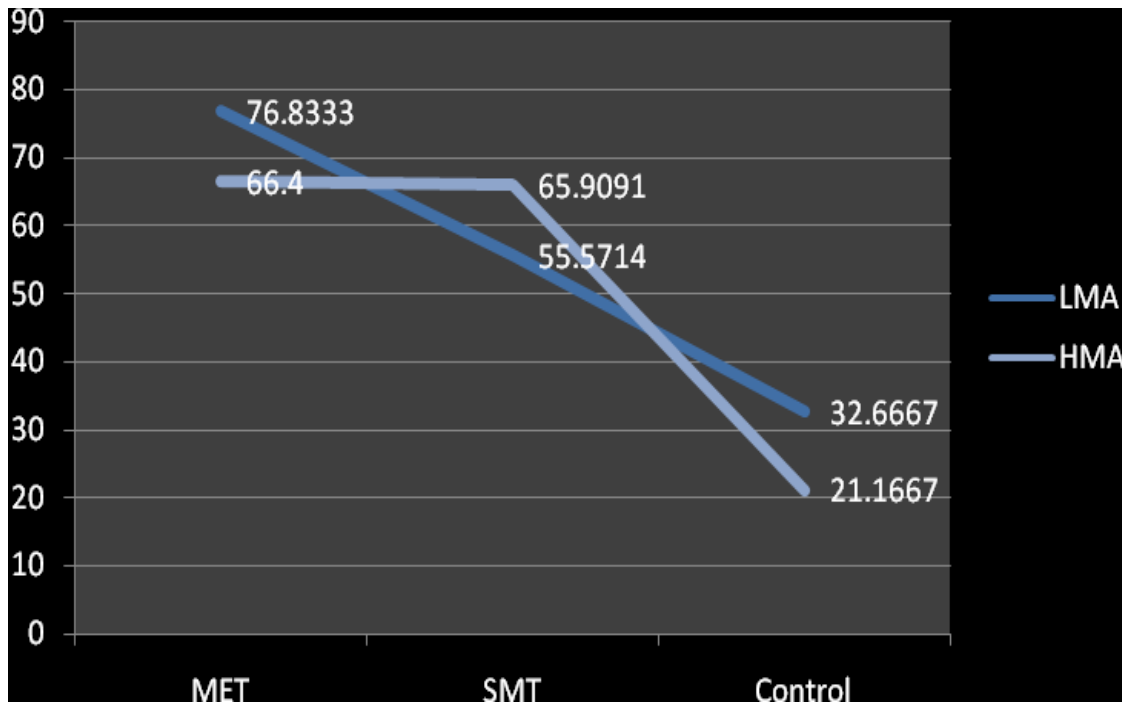


Figure 4.6: Interaction effect of treatment and Mathematics anxiety on students' Mathematics learning Gains

The result in Table 4.6a and figure 4.6 showed that there was significant interaction effect of treatment and Mathematics anxiety on students' Mathematics learning gains ($F_{(2, 77)} =$

7.866, $p < .05$, $\eta^2 = .170$). Therefore, the null hypothesis was rejected. This interaction is illustrated in figure 4.6. This implies that Mathematics anxiety influence the efficacy of treatment in enhancing students' Mathematics learning gains.

Hypothesis Thirteen: There is no significant interaction effect of gender and Mathematics anxiety on students' Mathematics learning gains

The result in Table 4.6a revealed that there was no significant interaction effect of gender and Mathematics anxiety on students' Mathematics learning gains ($F_{(1, 77)} = .081$, $p > .05$, $\eta^2 = .001$). Therefore, the null hypothesis was accepted. This means that gender and Mathematics anxiety did not significantly influence the Mathematics learning gains of students.

Hypothesis Fourteen: There is no significant three-way interaction effect of treatment, gender and Mathematics anxiety on students' Mathematics learning gains

Table 4.6a demonstrated that there was no significant interaction effect of treatment, gender and Mathematics anxiety on students' Mathematics learning gains ($F_{(2, 77)} = .060$, $p > .05$, $\eta^2 = .002$). By implication, the null hypothesis was accepted. This denotes that the impact of the treatment, gender and Mathematics anxiety in enhancing students' Mathematics learning gains was not significant.

4.3 Summary of Findings

The following are the summary of findings from the study;

1. There was significant main effect of treatment on students' Mathematics learning readiness ($F_{(2, 77)} = 64.171, p < .05, \eta^2 = .625$). Also, motivational enhancement Therapy ($\bar{x} = 75.23$) is more potent than self-monitoring skill training ($\bar{x} = 71.10$) and control group ($\bar{x} = 39.67$).
2. There was no significant main effect of gender on students' Mathematics learning readiness ($F_{(1, 77)} = .625, p > .05, \eta^2 = .008$).
3. There was main effect of Mathematics anxiety on students' Mathematics learning readiness ($F_{(1, 77)} = 18.871, p < .05, \eta^2 = .197$). The students with low Mathematics anxiety (estimated mean = 70.87) have high Mathematics learning readiness more than their counterpart with high Mathematics anxiety (estimated mean = 55.22).
4. There was no significant interaction effect of treatment and gender on students' Mathematics learning readiness ($F_{(2, 77)} = .407, p > .05, \eta^2 = .010$).
5. There was significant interaction effect of treatment and Mathematics anxiety on students' Mathematics learning readiness ($F_{(2, 77)} = 4.221, p < .05, \eta^2 = .099$). Mathematics anxiety influences the effectiveness of treatment in enhancing students' Mathematics learning readiness.
6. There was no significant interaction effect of gender and Mathematics anxiety on students' Mathematics learning readiness ($F_{(1, 77)} = 2.923, p > .05, \eta^2 = .037$).
7. There was no significant interaction effect of treatment, gender and Mathematics anxiety on students' Mathematics learning readiness ($F_{(2, 77)} = 1.136, p > .05, \eta^2 = .029$).
8. There was significant main effect of treatment on students' Mathematics learning gains ($F_{(2, 77)} = 82.224, p < .05, \eta^2 = .681$). Motivational Enhancement Therapy ($\bar{x} = 66.10$) is more effective in enhancing students' Mathematics Learning gains than self-monitoring skill training ($\bar{x} = 60.77$) and control group ($\bar{x} = 22.73$).
9. There was no significant main effect of gender on students' Mathematics learning gains ($F_{(1, 77)} = .133, p > .05, \eta^2 = .002$).

10. There was main effect of Mathematics anxiety on students' Mathematics learning gains ($F_{(1, 77)} = 31.299, p < .05, \eta^2 = .289$). Students with low Mathematics anxiety (estimated mean = 61.54) have high Mathematics learning gains than students with high Mathematics anxiety (estimated mean = 40.94).
11. There was no significant interaction effect of treatment and gender on students' Mathematics learning gains ($F_{(2, 77)} = .044, p > .05, \eta^2 = .001$).
12. There was significant interaction effect of treatment and Mathematics anxiety on students' Mathematics learning gains ($F_{(2, 77)} = 7.866, p < .05, \eta^2 = .170$).
13. There was no significant interaction effect of gender and Mathematics anxiety on students' Mathematics learning gains ($F_{(1, 77)} = .081, p > .05, \eta^2 = .001$).
14. There was no significant interaction effect of treatment, gender and Mathematics anxiety on students' Mathematics learning gains ($F_{(2, 77)} = .060, p > .05, \eta^2 = .002$).

CHAPTER FIVE

DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

This chapter presents the discussion of findings, conclusion, implications of the study, contributions to the knowledge, recommendations, limitations of the study, generalization of the study and suggestion for further study. The study investigated the effects of motivational enhancement therapy and self-monitoring skill training on Mathematics learning readiness and gains among school-going adolescents in Oyo State, Nigeria.

5.1 Discussion of Findings

Hypothesis One

The result of the first hypothesis revealed that there was significant main effect of treatment on students' Mathematics learning readiness. The result further revealed that Motivational Enhancement Therapy has the highest mean than Self-monitoring Skill Training and control group. By implication, motivational enhancement therapy is more potent in enhancing Mathematics learning readiness among school-going adolescents than self-monitoring skill training. This finding is consistent with the results of Fredricks (2004) and Gumora & Arsenio (2002) who stated that motivational enhancement therapy correlates significantly with learning readiness in middle school students. Although, many studies showed linear relationships between motivational enhancement therapy and learning readiness (Duckworth & Seligman, 2005; Wolfe & Johnson, 1995). Robbins et al. (2006) found a relationship between motivational enhancement and learning readiness in college students. That is, too high or too low motivational enhancement was associated with poor learning readiness in the freshman year of college. Motivational enhancement therapy has been found to be positively correlated to achievement, with highly motivational enhanced students are more eager to use planning, organisational, and self-monitoring strategies than low motivational students (Pintrich & De-Groot, 1994; Mousoulides & Philippou, 1990).

Also, self-monitoring skill training was however found from this study to enhance the students' Mathematics learning readiness. In line with this finding, Pintrich (2000) and Zimmerman (2008) found that self- monitoring learning is controlled by an interconnected framework of factors that determine its development and sustainability and learning readiness is a critical factor in this framework. Researchers have revealed that high achievers reported more use of self-monitoring skill training than lower achieving students (Pintrich & DeGroot, 1994;

VanZile-Tamsen & Livingston, 1999), and the assumptions of self-monitoring offer optimistic implications for teaching and learning. Self-monitoring is neither a measure of mental intelligence that is unchangeable after a certain point in life nor a personal characteristic that is genetically based or formed early in life. Students learn self-monitoring through experience and self-reflection (Pintrich, 1995). Studies also showed that self-monitoring skill training enhance permanent learning readiness and success (Cooper, 2008; Georghiades, 2004), improve questioning skills (Kramarski, 2008), develop social skills and success when used cooperatively (Flavell, 2000), enhance cognitive regulation (Mevarech & Amrany, 2008), help time management (Rosetta, 2000), and improve thinking and problem solving skills of learners. Similarly, (Desoete 2008; Shamir, Mevarech, & Charmit, 2009) found that self-monitoring skill training had positive effects on academic learning readiness and problem solving skills of learners. Studies at national level (Balcı, 2007; Demir, 2009) also found that self-monitoring skill training enhanced Mathematics learning readiness and problem solving skills of learners. Acquisition of learn self-monitoring leads learners to flexible thinking, planned study, and more effective problem solving skills. It is important to note that theorists agree that the most effective learners are those who can regulate their own learning (Butler & Winne, 1995).

Hypothesis Two

The result of the second hypothesis showed that there was no significant main effect of gender on students' Mathematics learning readiness. This denotes that there is no significant difference in the Mathematics learning readiness of male and female students. In consonance with this finding, experts in the study of gender such as Hyde (2004) and Hyde & Mezulis (2001) believed that the cognitive differences between females and males have been exaggerated overtime but does not influence learning readiness among students. For example, Hyde (2004) pointed out that there is considerable overlap in the distribution of females and males scores on Mathematics readiness and visuospatial tasks. In a personal study by the U.S. Department of Education (2000), boys did slightly better than girls at Mathematics and science learning readiness. Overall, though, girls were far superior students, earning better grades and were significantly better than boys in reading. In another national study, females had higher reading achievement and better writing skills than male with the gap widening as students progressed through school (Coley, 2001). A probable reason for inequality in sex selection in some sex dominated subjects could be adduced to mere cultural and social orientation from

parents and the entire society. However, the researcher is of the opinion that this idea can be readjusted for a better socioeconomic society where all individuals are given equal opportunity to perform all tasks irrespective of their sex. Campbell, Hombo & Mazzeo (1999), arguing along the same line, asserts that sex is not a good predictor of academic skills, interest or even emotional characteristics. By implication, gender has no effects on Mathematics learning readiness of the students and being male or female does not influence the level of students' Mathematics learning readiness in the school system.

Hypothesis Three

The result of the third hypothesis indicated that there was main effect of Mathematics anxiety on students' Mathematics learning readiness. It was further showed that students with low Mathematics anxiety have high Mathematics learning readiness more than their counterpart with high Mathematics anxiety. This finding is in corroboration with the finding of Ikegulu (1998) who reported that students with Mathematics anxiety only take Mathematics because it is required. He indicated that students who are Mathematics anxious avoid Mathematics, fail to complete homework assignments, and have a tendency to procrastinate (Ikegulu, 2008). Generally, positive readiness toward Mathematics is inversely related to Mathematics anxiety (Gourgey, 2004; Kincaid & Austin-Martin, 2001). Perceptions of Mathematics as useful were negatively related to anxiety for female college students with low Mathematics anxiety but unrelated among students with high levels of anxiety (Kincaid & Austin-Martin, 2001). Researchers have noted that Mathematics anxiety is more encompassing than test anxiety (Bessant, 1995; Betz, 2008) as it involves a general fear of contact with Mathematics (Hembree, 2009) and can involve emotional reactions to reading, studying, thinking about, and using a wide range of Mathematics skills (Bessant, 1995). By and large, Mathematics Anxiety has a great effect on Mathematics learning readiness of the students. Students with high Mathematics Anxiety demonstrate low Mathematics learning readiness than their counterpart with low Mathematics anxiety. As such, effort should be made to reduce the level of Mathematics anxiety among school-going adolescents in order to invariably enhance Mathematics learning readiness among the students.

Hypothesis Four

The result of the fourth hypothesis demonstrated that there was no significant interaction effect of treatment and gender on students' Mathematics learning readiness. This

means that gender did not significantly moderate the efficiency of the treatment in enhancing students' Mathematics learning readiness. In corroboration with this finding, Yoloje (1998) submitted that the result of the direct transfer of western curricula is a science and Mathematics education in most African countries that is exemplified by knowledge being transmitted by poorly trained teachers in under-resourced and sometimes overcrowded classrooms. As a consequence, the situation in Nigeria is that, academic learning readiness in Mathematics education is still deplorably low, both in certificate and non-certificate examinations. Many researchers identify inherent unfairness in school-based assessment (Grifith, 2005; Asim, 2007) which may result from teachers' incompetency in assessment (Asim, 2007), as well as learning readiness among other psycho-cultural factors being responsible for this anomaly. This poor Mathematics learning readiness of students is further worsened by gender imbalance leading to the problem which now constitutes a major research focus across the globe. In a study by Opolot-Okurut (2005) it was found that for all the attitudinal variables (anxiety, confidence and learning readiness), males had higher mean scores than females. That is, differences in student learning readiness in Mathematics based on gender were not confirmed. Gender is known not to have positive relationship with student learning readiness. This indicates that the understanding of the treatment packages and training programmes were not based on students being males or females. As a result of this, gender differentiation and discrimination should be avoided in given these treatments and any other related ones. The performance scores of the students in Mathematics learning readiness were not affected vis-à-vis the treatment programme given with gender distribution of the students.

Hypothesis Five

The result of the fifth hypothesis pointed out that there was significant interaction effect of treatment and Mathematics anxiety on students' Mathematics learning readiness. This implies that Mathematics anxiety influence the effectiveness of treatment in enhancing students' Mathematics learning readiness. In agreement with this finding, Reys, Lindquist, Lambdin, and Smith (2007) discussed various effects of Mathematics anxiety such as misunderstandings, poor performance on Mathematics tests, uncertainty, apathy, lack of confidence, dislike of Mathematics, low motivation, and classroom behaviour problems. The effects can also include avoiding Mathematics courses, limiting one's selection of college and career choice, declining Mathematics readiness, and feeling guilty or ashamed about Mathematics (Armstrong, 2005;

Betz, 2008; Adejumo, Oluwole & Muraina, 2015). Each of these or a combination can affect a student with far-reaching consequences (Newstead, 1998). Research showed that many of the students with Mathematics anxiety have revealed an over reliance on mathematical procedures as opposed to actually understanding the Mathematics concept. When students resort to memorizing procedures, rules, and routines without much understanding, the concept is forgotten and panic sets in. Experts argue that “Mathematics anxiety” can bring about rife, intergenerational discomfort with the subject, which brings effects ranging from fewer students pursuing Mathematics and science careers to less public interest in the subject. Mathematics anxiety feels negative emotions when engaging in an activity that requires numerical or Mathematics skills (Sparks, 2011). Mathematics anxiety remains an indispensable factor that influence the effectiveness of treatment programmes given. The Students with high Mathematics anxiety tends to demonstrate lower understanding of the treatment than their counterpart with low Mathematics anxiety. The reflection of this could be inferred from the level of Mathematics learning readiness among the students based on the interaction effect of treatment and Mathematics anxiety. By and large, Mathematics anxiety has a great effect on Mathematics learning readiness of the students. Students with high Mathematics anxiety demonstrate low Mathematics learning readiness than their counterpart with low Mathematics anxiety. As such, the level of Mathematics anxiety should be drastically reduced in order to enhance the understanding of the students in a given interventions targeted to enhance Mathematics learning readiness among the students.

Hypothesis Six

The result of the sixth hypothesis showed that there was no significant interaction effect of gender and Mathematics anxiety on students’ Mathematics learning readiness. This means that gender and Mathematics anxiety did not significantly enhance the Mathematics learning readiness of students. This finding is in line with the findings of Idu (2008) and Omirin (1999) who find that no significant difference exists between the scores of male and female students on the same instruments developed for measuring readiness towards Mathematics and science oriented subjects respectively. The study of Adebule (2004) on a comparative investigation as to whether there will be any significant difference between the scores of male and female students on a locally standardized rating scale in Mathematics for Nigerian students showed that there was no significant difference between the ratings of both male and female students and that

gender issues did not influence the response on the scale. Ikegulu's research demonstrates that the combined effect of Mathematics anxiety and gender may influence the academic performance of students differently than their college-ready peers (Ikegulu, 2008, 2000). Differences exist with regard to Mathematics anxiety on the basis of demographic characteristics, including ethnicity, gender, and age. Ho, Brown, Driver & Murray (2000) investigated differences in the cognitive (worry) and affective (nervousness, fear, dread) dimensions of Mathematics anxiety on Mathematics achievement of students from the United States, Taiwan, and China. However, gender has no interaction with Mathematics anxiety among the students and as such being male or female does not depict the level of students' Mathematics anxiety in the school system. With gender discrimination against Mathematics anxiety need to be avoided as it was shown that differences in Mathematics anxiety has nothing to do with being male or female. And also, assumption that female may be fearful than male in solving mathematical questions has proved unrealistic and vice versa.

Hypothesis Seven

The result of the seventh hypothesis demonstrated that there was no significant interaction effect of treatment, gender and Mathematics anxiety on students' Mathematics learning readiness. This denotes that the impact of the treatment, gender and Mathematics anxiety in enhancing students' Mathematics learning readiness was not significant. In consonance with this finding, Okeke (2003) found that gender is just mere identification of male and female sexes but doesn't has any significant effects in the students learning readiness and understanding of instructional contents. Scholars have gone further to identify responsibilities assigned to opposite sexes and to analyze the conditions under which those responsibilities are assigned. Furthermore, Okeke (2003) specifically notes that the study of gender means the analysis of the relationship of men and women including the division of labour, access to resources and other factors which are determined by society as opposed to being determined by sex. It further involves the study of the socio-cultural environment under which responsibilities are assigned and the relationships emanating from it. Thus, gender equally projects the properties that distinguish and classify organisms on the basis of their reproductive and cultural expectant roles. Females are more likely than male to be assigned to special/remedial education classes – females are more likely to be engaged with academic materials, be attentive in class, put forth more academic effort, and participate more in class than boys (Dezolt & Hull, 2001).

Also, it is very clear here that gender (that is being male or female) and the level of Mathematics anxiety (high or low) have no interaction with the understanding pattern of the treatment programme by the students. As such, lack of interaction here made it impossible for us to discriminate unnecessarily with gender in term of training comprehension among students and behavioural influence (Mathematics learning readiness).

Hypothesis Eight

The result of the eighth hypothesis indicated that there was significant main effect of treatment on students' Mathematics learning gains. The result further demonstrated that Motivational Enhancement Therapy has the highest mean than the Self-monitoring Skill Training and control group. By implication, motivational enhancement therapy is more potent in enhancing Mathematics learning gains among school-going adolescents than self-monitoring skill training. This is in corroboration with the finding of Deci and Ryan (1985) and Elliot and Harackiewicz (1996) who stated that motivational enhancement therapy plays a crucial role affecting learning gains of students at different levels of education. Deci and Ryan (1985) and Deci et al. (1991), for example revealed that students who had more self-determined or autonomous motivation (e.g., intrinsic motivation) for school works and activities were more likely to stay in school and perform better compared to their counterpart students who had less self-determined motivation. In addition, they indicated that high learning gains is a function of students' sense of autonomy. Similar findings have also been reported in research conducted in Africa. Ali (2015) also investigated the relationship between motivational enhancement therapy and Mathematics academic performance with a sample of college students in Zambia. He however found a significant and positive relation among motivational enhancement therapy and Mathematics academic performance, indicating that students who had high motivational enhancement therapy performed significantly better than their counterparts who had low motivational enhancement therapy on academic performance, as measured by the averages of the term examination grades. Research with high school students has also documented consistent findings that motivational enhancement therapy plays a vital role in significantly and positively affecting learning gains.

Also, self-monitoring skill training was however found to enhance students' Mathematics learning gains. In line with this finding, Mace and Kratochwill (1985) showed that self-monitoring significantly reduced Mathematics gains in college students and Lan's (1993)

experiment on the effects of self-monitoring on college students' statistics course grades resulted in the self-monitoring group outperforming the instructor-monitoring and control groups. However, in a similar experiment involving children studying Mathematics (Schunk, 1983), the post-treatment achievement scores of the self-monitoring group of children were comparable with those of the externally monitored group. A cross-sectional Mathematics monitoring study by Hest (2000) showed that the ability to monitor one's problem solving errors is a valid predictor of acquisition. In a review of monitoring and self-repair in Mathematics learning gains, Kormos (1999) concludes that the self-monitoring of students aids acquisition and is a positive correlate of Mathematics learning gains. In two descriptive studies, Charles (1990) and Cresswell (2000) emphasized the importance of self-monitoring through the technique of writing notes or annotations. Checking one's reading comprehension is also considered useful and is recommended for developing reading skills (Block, 1992). It has been extensively argued that self-monitoring and similar strategies are characteristics of good learners and enhance learning (Wenden, 1991).

Hypothesis Nine

The result of the ninth hypothesis showed that there was no significant main effect of gender on students' Mathematics learning gains. This denotes that there is no significant difference in the Mathematics learning gains of male and female students. In line with this finding, research of gender differences in cognitive processes, intellectual abilities, area of interest, stereotypical perceptions of every-day behaviour and the ability to perform various tasks has not been conducted. The differences in the scholastic achievements of boys and girls are generally attributed to biological causes and/or to cultural and stereotypes (Klein, 2004). The last two decades have been devoted to addressing gender inequality in education. Some studies (Okebukola, 1993; Jiboku, 2008) have shown an all time low participation of women in education. Educators have therefore expended tremendous efforts in the study of the personal factors affecting learning gains especially in the sciences and social sciences. Notable among these variables is the study of the phenomenon of gender or sex equity in education. A rich harvest of explanation of causes, understanding of cost to the society and possible intervention has brought about several researches, workshops, seminars and training in this area. Also, Campbell, Hombo & Mazzeo (1999) asserts that sex is not a good predictor of academic skills, interest or even emotional characteristics. By and large, gender has no significant effects

on Mathematics learning gains of the students and being male or female does not influence the level of students' Mathematics learning gains in the school system.

Hypothesis Ten

The tenth hypothesis revealed that there was main effect of Mathematics anxiety on students' Mathematics learning gains. This further implies that students with low Mathematics anxiety have high Mathematics learning gains more than their counterpart with high Mathematics anxiety. In relation with this finding, Ma (1999) found that the relationship between Mathematics anxiety and Mathematics achievement is significant. It was also found that once Mathematics anxiety takes shape, its relationship with Mathematics achievement is consistent across grade levels. Satake and Amato (1995) and Hardfield et al. (1992) also reported similar findings that Mathematics anxiety has significant effect on Mathematics achievement. A high level of anxiety is associated with a lower level of achievement (Quilter & Harper, 2013). Other than achievement, Tapia (2004) reported that students having little or no Mathematics anxiety scored significantly higher in motivation than students with some or high Mathematics anxiety, and students with some Mathematics anxiety scored significantly higher than students with high Mathematics anxiety. Norwood (1994) also emphasized that Mathematics anxiety did not appear to have single cause, but was, in fact, the result of many different factors such as truancy, poor self image, poor coping skills, teacher readiness and emphasis on learning Mathematics through drill without understanding. Butterworth (1999) believes that a lack of understanding is the cause of anxiety and avoidance and that understanding based learning is more effective than drill and practice. A lack of confidence when working in mathematical situations is described by Stuart (2000) as the cause of Mathematics anxiety. Highly Mathematics anxious individuals will be less fluent in computation, less knowledgeable about Mathematics, and less likely to have discovered special strategies and relationships within the Mathematics domain (Ashcraft & Faust, 1994). Mathematics Anxiety has a great effect on Mathematics learning gains of the students. Students with low Mathematics Anxiety demonstrate high Mathematics learning gains than their counterpart with high Mathematics anxiety. As such, effort should be made to reduce the level of Mathematics anxiety among school-going adolescents in order to enhance the Mathematics learning gains among school-going adolescents in the school system.

Hypothesis Eleven

The result of the eleventh hypothesis revealed that there was no significant interaction effect of treatment and gender on students' Mathematics learning gains. This demonstrates that gender (in term of being male or female) did not significantly moderate the effectiveness of the treatment in enhancing students' Mathematics learning gains. In support of this finding, societal factors that can lead to gender differences in Mathematics achievement have been widely studied. The disadvantages associated with low socioeconomic status lead to lower than average test scores for low socio-economic status students. In widely available U.S. datasets, parents' education, family income and family possessions are usually used as measures of socio-economic status. There is some evidence that socioeconomic status impacts women more than men. Ware et al. (2005) also showed that women from more privilege backgrounds are more likely to choose science major and among those in science majors, women are more likely than men to have mothers employed in prestigious occupations (Ware & Lee, 2005). Sax (1996) found that women with science, Mathematics or engineering undergraduate degrees whose mothers were research scientists or college teachers were more likely to pursue graduate work. This implies that differences in the understanding of training by the student are not by thie gender make up. Gender was found not to have interaction treatment and students' learning gains. This indication that the understanding of the treatment packages and training programmes were not based on students being males or females. As a result of this, incessant gender discrimination should be avoided in given any related treatments to the students. The performance scores of the students in Mathematics learning gains, as shown in this study, were not affected vis-à-vis the treatment programme given with gender distribution of the students.

Hypothesis Twelve

The result of the twelveth hypothesis showed that there was significant interaction effect of treatment and Mathematics anxiety on students' Mathematics learning gains. This implies that Mathematics anxiety influence the efficacy of treatment in enhancing students' Mathematics learning gains. In direction with this finding, Fennema and Sherman cited in Ma (1999) found that Mathematics anxiety and Mathematics ability concepts were highly correlated in a sample of secondary school students. Mathematics anxiety has a highly negative relationship with Mathematics performance and achievement, which has been described in some studies (Hembree, 2009; Mevarech, Silber & Fine, 1991). Mathematics anxiety is an important

factor in poor performing and achieving Mathematics (Richardson & Suinn, 2002) documented the negative effects of Mathematics anxiety on Mathematics performance and achievement. From the extensive research on co-relationship between Mathematics anxiety and students performance in Mathematics it can be noted that the Mathematics anxiety is a crucial factor for the students' poor performances in Mathematics. If this factor is not taken into account sincerely and handled properly and effectively by the parents, educators, students themselves, schools and the policy making authorities concerned then it could have a terrible consequences for the entire education system, for instance, some major negative consequences of Mathematics anxiety are Mathematics avoidance (Hembree, 2009), the effects of Mathematics anxiety are tied to those cognitive operations that rely on the resources of working memory (Ashcraft, 2002), distress (Tobias, 1993) and interference with conceptual thinking and memory processes (Skemp, 2014). Mathematics anxiety seems to be an important factor that influences the effectiveness of training interventions given in this study. The Students with low Mathematics anxiety tends to demonstrate higher understanding of the treatment programmes than their counterpart with high Mathematics anxiety. The reflection of this could be seen from the level of Mathematics learning gains among the students based on the interaction. By and large, Mathematics anxiety has a great effect on Mathematics learning gains of the students. As such, the level of Mathematics anxiety should be drastically reduced in order to enhance the understanding of the students in a given interventions targeted to enhance Mathematics learning readiness among the students.

Hypothesis Thirteen

The result of the thirteenth hypothesis demonstrated that there was no significant interaction effect of gender and Mathematics anxiety on students' Mathematics learning gains. This means that gender and Mathematics anxiety did not significantly influence the Mathematics learning gains of students. This finding is consistent with the finding of Macrae (2003) who found that Mathematics anxiety is more closely associated with females than with males, a finding shared by Ashcraft (2002), but the difference tends to be small and perhaps due in part to a more open disclosure of feelings by women, although Ashcraft and Faust (1994) also found the opposite tendency at low anxiety levels. The importance of gender difference in the association of anxiety in Mathematics with test and trait anxiety is further underscored by the results of Frost (2004) who discovered that large gender differences do exist with respect to

readiness towards Mathematics. She noticed that slight differences may be found concerning anxiety towards Mathematics, girls being more anxious than boys. Through structural equation modeling, they discovered that affective dimensions of Mathematics anxiety inversely affected Mathematics performance among students from all three nations; whereas the cognitive dimension of Mathematics anxiety only affected the performance of Taiwanese students. Because cognitive Mathematics anxiety was positively related to achievement in Taiwanese students, the researchers inferred that worry may serve as a motivating factor among Taiwanese students (Ho et al., 2000). Gender has no interaction with Mathematics anxiety among the students and as such being male or female does not depict the level of students' Mathematics anxiety in the school system. Also, gender discrimination against Mathematics anxiety need to be avoided as it was shown that differences in Mathematics anxiety has nothing to do with being male or female and that general perception that female may be fearful than male in solving mathematical questions has been proved unrealistic and vice versa.

Hypothesis Fourteen

The result of the fourteenth hypothesis indicated that there was no significant interaction effect of treatment, gender and Mathematics anxiety on students' Mathematics learning gains. This denotes that the impact of the treatment, gender and Mathematics anxiety in enhancing students' Mathematics learning gains was not significant. By implication, the students understanding of the treatment programme has nothing to do with the gender (being male or female) and Mathematics anxiety (high or low). In accordance with this finding, the ability of a student to self-monitor his or her performance is a natural step toward becoming independent, which can only happen when students take responsibility for their own behaviour and essentially become agents of change (Porter, 2002; Rutherford, Quinn, & Mathematicsur, 1996). Similar study by Azevedo, Cromley, and Seibert (2004) provided additional evidence that not all students are capable of regulating their learning readiness and gains and that this inability leads to inferior learning gains, and that these same students fail not significant interm of gender and Mathematics anxiety. This means that the male and female students have no difference in the understanding of treatment packages of motivational enhancement therapy and self-monitoring skill training. Also, the students with high Mathematics anxiety and those with low Mathematics anxiety has no significant difference in the comprehension treatment packages of motivational enhancement therapy and self-monitoring skill training. Also, it is very clear here

that gender (that is being male or female) and the level of Mathematics anxiety (high or low) have no interaction with the understanding pattern of the treatment programme by the students. As such, lack of interaction here clarifies the fact that the incessant discrimination among teachers and students with gender in term of Mathematics related training comprehension among students and behavioural influence (Mathematics learning readiness) should be avoided.

5.2 Conclusion

Base on the findings of this study, persistent poor learning readiness and gains of Nigerian secondary school students in mathematics need not to continue indefinitely. There is hope that with the use of motivational enhancement therapy and self-monitoring skill training, the situation can be changed for the better. The study discovered that motivational enhancement therapy and self-monitoring skill training could be used in enhancing Mathematics learning readiness and gains among secondary school students in the school. By and large, motivational enhancement therapy and self-monitoring skill training has great effects on the mathematics learning readiness and gains among students. As such, it is very crucial to improve on the use of these skill training and therapy (motivational enhancement therapy and self-monitoring skill training) so as to eradicate the persistent occurrence of students' poor learning readiness and gains in this great subject.

By and large, it was also concluded from this study that gender discrimination and Mathematics anxiety have a great impact on the students' Mathematics learning readiness and gains in the school. This means that gender discrimination and high Mathematics anxiety definitely have a negative effect on students' learning readiness and gains in Mathematics. By implication, students' learning readiness and gains in mathematics can be improved through reduced gender discrimination and Mathematics anxiety in the school system. Therefore, these factors are to be managed and controlled in our schools for us to have efficient and improved students' Mathematics learning readiness and gains not only in Oyo State but also in other States of Nigeria and other Country at large.

5.3 Implications of the Finding

The study examined the effects of motivational enhancement therapy and self-monitoring skill training on Mathematics learning readiness and gains among school-going adolescents in Oyo State, Nigeria. By and large, the study has unraveled the problems associated with

Mathematics learning readiness and gains and also helped to provide psychological interventions and strategies towards finding a lasting solutions to the problem.

The study has also established the fact that motivational enhancement therapy and self-monitoring skill training is effective in enhancing Mathematics learning readiness and gains among students in the school system. This will make the stakeholders in education to make use of the strategies effectively and efficiently.

In addition to other skill trainings and therapies, the study has provided psychological interventions (motivational enhancement therapy and self-monitoring skill training) for educational stakeholders to use towards enhancing the Mathematics learning readiness and gains among school-going adolescents; this will help in adopting effective eradication of mass failure and enhance Mathematics learning gains in the school system.

The need for further concentration on the issues of learning readiness and gains among students not only in Mathematics but also in other subjects are however stated for researchers and educational stakeholders. This will help in reducing the problems of poor learning readiness and gains among school-going adolescents.

The study has demonstrated to the experts in the field of Mathematics and other related disciplines such as assessment and testing, statistics, economics among others, the need to work collaboratively towards reducing the Mathematics anxiety of the students. This will help in overcoming the challenges of poor learning readiness and gains among the students in the school.

5.4 Contributions to Knowledge

It is important to examine the contributions of this study to knowledge in education and counseling psychology. The study has widened the knowledge of experts in educational testing/evaluation and counseling/educational psychologists on the problems associated with Mathematics learning and helped to develop psychological interventions and strategies towards the eradication of the problem. And this will then help in reducing the rate of academic failure among secondary school students in Mathematics.

The study has also established the fact that aside from the use of motivational enhancement therapy in reducing drug/substance addiction, it can still be used effectively in enhancing Mathematics learning readiness and gains among students in the school system.

The study however found that self-monitoring skill training as one of the sub-components of metacognitive skill training is efficient in improving the learning processes of students especially in the area of Mathematics learning readiness and gains in the school. It also serves as eyes opener in researching into the effectiveness of other sub-components of metacognitive skill trainings such as self-evaluation and self-control skill training among others.

In collaboration with other study habit procedures, the study has provided additional interventions (motivational enhancement therapy and self-monitoring skill training) for the students to use towards enhancing their Mathematics learning readiness and gains in the school, this will help the students to adopt effective learning skills and enhance their Mathematics learning gains in the school.

The study has opened up the stakeholders in education for further investigations on the issues of learning readiness and gains among students not only in Mathematics but also other subjects in the school system. This will help in reducing the problems of poor learning readiness and gains among school-going adolescents.

The study has brought to the awareness of the parents, teachers and other stakeholders in education the effects of Mathematics anxiety on students' Mathematics learning readiness and gains in the school. This will help in collaborative efforts to assist the students in overcoming the challenges of Mathematics anxiety/phobia which will in turn enhance the students' Mathematics learning readiness and gains in the school.

It has also been proved from the findings of this study that gender has no influence on Mathematics learning readiness and gains among students. As such, the home and school should be able to desist from gender discrimination and work as a team towards gender equality and enhanced Mathematics learning readiness and gains among students in the school.

The effectiveness of two treatment interventions (motivational enhancement therapy and self-monitoring skill training) on students' Mathematics learning readiness and gains has been confirmed, by implication the government and general public will be aware of these interventions and work towards better effective usage to improve learning readiness and gains of students not only in Mathematics but also in the other science and non-science related subjects in the school.

The findings in this study served as a source of reference/document for other researchers who may want to conduct the same or similar study in other subjects or part of the country.

However, the study filled the gaps in the previous study and added more to the existing literatures.

5.5 Recommendations

Based on the findings in this study, the following recommendations were made;

1. The students in the school should be encouraged and trained on the effective usage of these interventions (motivational enhancement therapy and self-monitoring skill training). This will make the students to adopt effective learning skills towards enhancing their Mathematics learning readiness and gains in the school.
2. The researchers and stakeholders in education should not only focus on the students' learning gains alone but also their learning readiness. This is because the affective aspect (readiness) of the students has a lot of implications and influence on the learning processes.
3. Experts in educational testing/evaluation and Counseling/Educational psychologists should intensify their effort to organize seminars/conferences on the implications of these moderating variables (that is gender, Mathematics anxiety among others) as they interact with students' Mathematics learning readiness and gains in the school.
4. Counseling/Educational psychologists should use in addition to other counselling interventions, motivational enhancement therapy and self-monitoring skill training in enhancing Mathematics learning readiness and gains among students in the school system. This will help the Counseling/Educational psychologists in reducing the rate of academic failure among secondary school student in Mathematics.
5. The public and private schools should endeavour to provide enabling environment for the staff and students of the schools. This will help in enhancing the achievement motivation of the students and invariably improve students' Mathematics learning readiness and gains in the school.
6. The parents/guardians should be enlightened on the impacts of their involvement in the students learning processes most especially in the area of improving gender equality and reducing students' Mathematics anxiety. This will go a long way in enhancing their Mathematics learning readiness and gains among secondary school students.
7. The teachers and other stakeholders in educational sectors are to be trained on how to inculcate effective skill trainings toward reducing students' Mathematics anxiety in the school system. This will serve as collaborative efforts to assist the students in overcoming the

challenges of high Mathematics anxiety/phobia which will in turn enhance the students' Mathematics learning readiness and gains in the school.

8. The home (parents/guardians) and school (school management) should work as a team towards reducing gender discrimination and students' Mathematics anxiety which invariably contributes significantly to the level of Mathematics learning readiness and gains among students in the school.

9. The policy makers and general public should be aware of these interventions (motivational enhancement therapy and self-monitoring skill training) and work towards better effective usage to improve learning readiness and gains of students not only in Mathematics but also in the other science and non-science related subjects in the school.

10. The school should have at least a practicing counselling/educational psychologist who will be saddled with the responsibility of using the psychological principles and therapies (scheduled in the school timetable) in enhancing the learning readiness and gains of the students not only in Mathematics but also in other subjects in the school.

11. The curriculum planners and policy makers in education should integrate into the programmes designed to improve the quality of education, emphasis on student-centered trainings such as motivational enhancement therapy and self-monitoring skill training among others, this will help in efficient eradication of poor Mathematics learning readiness and gains among school-going adolescents in the school system.

12. School time table should be planned such a way that Mathematics lesson must come in the morning; this will help in arousing the students' Mathematics learning readiness and invariably enhance their Mathematics learning gains.

5.6 Limitations to the Study

All research projects have limitations and the present one is of no exception, therefore the limitations are stated below;

The study was only carried out in Saki Educational Zones of Oyo State and three (3) Local Governments were randomly selected, as such the other educational Zones and Local Governments in the States did not benefit from the training.

The study used only three (3) schools out of many other schools in the randomly selected Local Government that constitutes the Saki Educational Zones of Oyo State, as such

schools in the other Zones and Local Government in the States were deprived from benefitting from the training.

The study consisted of just ninety (90) school-going adolescents in JSS 2, which seems to be far from the number of JSS 2 students in the Zone. Also, the study used only selected JSS 2 students; as such students in the other level of education in the States were not included among those that were involved in the training.

The study emphasized only on the effects of motivational enhancement therapy and self-monitoring skill training on Mathematics learning readiness and gains among school-going adolescents leaving out other therapies such as self-regulated skill training, coherence therapy, cooperative learning among others.

The study seek to determine the effectiveness of motivational enhancement therapy and self-monitoring skill training in enhancing Mathematics learning readiness and gains among school-going adolescents leaving other subjects such as English Language, Biology, Chemistry among others untouched.

The moderating variables selected in this study were gender and Mathematics anxiety leaving out other organismic and environmental factors such as emotional intelligence, Mathematics Self-efficacy, school climate and school location among others.

5.7 Generalization of the Study

The study was carried out in Saki Educational Zones of Oyo State and three (3) Local Governments were randomly selected, as such findings of this study could be generalised on other educational Zones and Local Governments in the States and the country at large.

The study used three (3) schools and ninety (90) school-going adolescents in JSS 2, it is believed that the outcomes of this study could be generalised on other schools and students in the states and the country at large.

The study used only selected students JSS 2; as such the results from this study could be inferred on the students in the other level of education in the States and the country generally.

The study seek to determine the effectiveness of motivational enhancement therapy and self-monitoring skill training in enhancing Mathematics learning readiness and gains and the two moderating variables selected were gender and Mathematics anxiety. By and large, the outcomes of this study could be generalised on other science and non-science subjects such as English Language, Biology, and Chemistry among others which were not captured in this study.

5.8 Suggestions for Further Research

This study investigated into the effects of motivational enhancement therapy and self-monitoring skill training on Mathematics learning readiness and gains among school-going adolescents in Oyo State, Nigeria. In view of this, further researches may be carried out in other states to determine the use of motivational enhancement therapy and self-monitoring skill training in enhancing learning readiness and gains among school-going adolescents in other subjects such as English language, Yoruba Language and Chemistry among others. However, other researches can concentrate on teacher variables as determinants of Mathematics learning readiness and gains among school-going adolescents. Further researches can investigate demographic and psychosocial factors as predictors of Mathematics learning readiness and gains among school-going adolescents in Nigeria. Lastly, researches can concentrate on development, validation and use of Mathematics learning readiness scale for school-going adolescents in Nigeria.

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APPENDICES
APPENDIX 1
TREATMENT PACKAGE
EXPERIMENTAL GROUP 1 (MOTIVATIONAL ENHANCEMENT THERAPY FOR
MATHEMATICS LEARNING READINESS)

Session 1

Topic: General Introduction and Administration of Instrument to obtain Pre-test Scores

The purpose of this session is to administer Mathematics learning readiness scale (MLRS), Mathematics anxiety as well as attitude to Mathematics scale (AMS) so as to determine the students who will be able to benefit and participate in the training. Also, the administration of these instruments demonstrates the present situational level of the participants regarding the dependent variable (Mathematics learning readiness) and moderating variables (Mathematics anxiety and gender make-up).

Activity

- The researcher warmly welcomed the participants into the programme. Participants were informed that they will be having eight (8) sessions of 1 hour 20 Minutes each for a period of eight weeks.
- The researcher explained the reason for the programme and the benefit attached at the end of the programme.
- The researcher also explained the rules guiding the conduct of the programme and what is expected of the participants.
- The researcher administered the pre-test instruments to the participants.
- The participants were given a take home assignment to identify different factors that contribute to poor Mathematics learning readiness in the school.

Closing Remarks:

- The participants were commended for their cooperation and encouraged to do their homework.
- They were also reminded of the time and venue for the next session.

Session 2

Topic: The Meaning and Stages of Motivational Enhancement Therapy

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

- Discuss the issues and problems of Mathematics learning readiness
- Understand the meaning of Motivational Enhancement Therapy

- Identify the different therapeutic strategies of Motivational Enhancement Therapy

Activity

- The participants were welcomed warmly.
- The researcher also reviewed the assignment with the participants and provided accurate empathy for the students on Mathematics learning readiness.
- The researcher explained the meaning of motivational enhancement therapy to the participants in relation to Mathematics learning readiness as thus:
- Issues and problems of Mathematics learning readiness as follow: Learning is an essential component of academic learning readiness and gains but every type of learning is not necessarily included in learning readiness and gains. Learning could be in any direction; positive or negative, intentional or accidental. However, learning gains is necessarily positive with reference to the objectives of the study, intentional and outcome of an instructional program. Good academic learning gains is very important not only to students and their parents, but also to institutions of learning, educationists of any progressive nation and other stakeholders. Resultantly much concern is being expressed over the continuous poor academic performance of students in Nigeria, particularly of secondary school students. Several researchers have recommended incorporating readiness toward learning or the subject matter into studies of cognition and learning gains.
- Motivational enhancement therapy, also known as motivational interviewing therapy, is a Motivational enhancement therapy is a therapeutic approach based on the premise that students will best be able to achieve change when motivation comes from within themselves, rather than being imposed by the therapist. Motivational interviewing, the primary element of MET, was developed by Miller and Rollnick (1991). It is a trans-theoretical model derived from a number of sources; including stages of change theory, client-centered approaches, and research into what clinician behaviour are associated with the best Mathematics learning readiness. The therapy is based on its core principle of learning processes.
 - Therapeutic Strategies of Motivational Enhancement Therapy are:
 - Learning Environmental mastery
 - Personal Growth and Objectives in Learning
 - Express of Urge and Motives
 - Develop Discrepancy

○ Support Self-Efficacy

As a take home assignment, participants were asked to write out what they understand by the term Motivational Enhancement therapy and its strategies.

Closing Remarks:

- The researcher commended the participants for their cooperation.
- The participants were reminded to do their homework
- They were intimated also with the time and venue for the next session.

Session 3

Topic: Learning Environmental Mastery

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

- Explain learning Environmental mastery

Activity

- The participants were welcomed warmly
- The researcher reviewed the assignment with the participants.
- He also explained to participants the meaning of environmental mastery and presented likely examples as thus:

Learning Environmental mastery is the ability of a student to have a sense of mastery and competence in managing the learning environment; controls external activities; makes effective use of surrounding opportunities; able to create or choose contexts suitable to personal learning needs and values. The therapist explain further that students who do not have sense of learning environmental mastery often feel that nothing good can come out of their Mathematics learning readiness, they express feelings like; I am not hate Mathematics, I am a failure of Mathematics, Mathematics topics are difficult e.t.c. This lack of sense of control in learning environment leads the client to miss surrounding opportunities with the possibility of subsequent regret over their learning readiness in Mathematics. Consideration is here given to the environment of study as it appears to have adverse effect on the whole attitude and Mathematics learning readiness. Where one studies has an important effect on one's efficiency because the location and all of its characteristics are stimuli. The stimulus of the study situation should produce the response of studying and no other response. It has been suggested that an important approach is to have a set aside specifically for study. It should be well ventilated, noise free and well lighted room or open place with a desk and a chair to enhance Mathematics learning readiness. Ruch (1995) wrote on the need to consider the type of chair and desk used

for study in order to improve Mathematics learning readiness. These should be such that allow the individual to maintain an erect and mental capacity to the acquisition, understanding and organisation of knowledge; it often involves and improves Mathematics learning readiness forms.

Assignment

- As a take home assignment, participants were asked to write out what they understand by the term learning environmental mastery.

Closing Remarks:

- The researcher commended the participants for their time and cooperation.
- The participants were reminded to do their homework.
- Time and venue for the next session were made known to the participants.

Session 4

Topic: Developing Personal Growth and Objectives with Learning Readiness

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

- Define Personal growth.
- Be able to identify and define their objectives in line with learning readiness

Activity

- Participants were welcomed warmly
- The researcher reviewed the assignment with the participants

The researcher also explained learning readiness as concept that is concerned with an individual way of thinking, acting and behaving toward object or subject. It has very serious implications for the learner, the teacher, the immediate social group with which the individual learner relates and the entire school system. Readiness is formed as a result of some kind of learning experiences. They may also be learned simply by following the example or opinion of parent, teacher or friend. This is mimicry or imitation, which also has a part to play in the teaching and learning situation personal growth citing example the students will have a feeling of continued developmental trend; see themselves as growing and expanding; open to new learning experiences; has sense of realizing their learning potential; see improvement in themselves and behaviour over time. The students have goals in learning and sense of direction; feeling that there is meaning to present and past life learning in Mathematics; holds beliefs that give aims and objectives for learning Mathematics. This approach is basically resident in the therapist rather than the participants.

Closing Remarks:

- The researcher commended the participants for their cooperation.
- The participants were reminded to do their homework
- They were reminded of the time and venue for the next session.

Assignment

- As a take home assignment, participants were asked to identify their personal growth and enumerate their potentials in Mathematics learning readiness.

Session 5:**Topic: Express of Urge and Motives**

Objectives: The following objectives are expected to be achieved at the end of this session:

- The participants should be able to explain the meaning of urge and motive.
- They should be able to evaluate developed urge and motives in relation to Mathematics learning readiness.

Activity

- The participants were warmly welcomed and the researcher reviewed home work of the previous session with them.
- The researcher explained that a student who has urge and motive is an individual who is self-determined to learn irrespective of the conditions/situation; able to resist to solving problems; regulates behaviour from within; evaluates self by personal acceptance. Motive has received much attention from many researchers with different psychological and philosophical perspectives in different fields of study, especially psychology and education due to its significant effect on students' learning, persistence and academic achievement. It has been operationalized from the perspective of different theoretical approaches over the past decades. For instance, acceptance implies that good interaction and relationship between the teachers and learners are important aspect of Mathematics learning readiness. This treatment approach is not based on confrontation of superiority or inferiority but rather student-teacher relationship. It is important that the learners should not give the impression that Mathematics procedure is too long or cumbersome but rather master the approaches and procedure. Much of MET is listening rather than telling/thinking. Empathic listening and accurate reflection are crucial to facilitating change and learning readiness in Mathematics. If learners feel that

they are truly understood and accepted the procedure, they will be increasingly open to viewing the teachers as a valid consultant to their personal change process.

Assignment

- As a take home assignment, participants were asked to explain the meaning of urge and motive and its relevance to Mathematics learning readiness

Closing Remarks:

- The researcher commended the participants for their cooperation.
- The participants were reminded to do their homework
- They were intimated with the time and venue for the next session.

Session 6:

Topic: Develop Discrepancy

Objectives: At the end of this session the following should be attained:

- The participants should be able to understand how to develop discrepancy
- They should be able to develop appropriate discrepancy strategies in collaboration with Mathematics learning readiness

Activity

- The participants were appreciated for coming and their homework was reviewed by the researcher.
- The researcher explained the meaning and strategies of developing discrepancy, stating clearly that such students who develop discrepancy; accepts his/her good and bad qualities; feels positive about past life in learning will have an improved Mathematics learning readiness. However, Motivation for change occurs when people perceive a discrepancy between where they are and where they want to be. In employing this MET strategy, the researcher helps learners to recognize the discrepancy between the effects of poor Mathematics learning readiness on their lives now and how they would like their lives to be. Awareness of this discrepancy may well drive the desire for change. Here, again, the researcher needs to convey the same respect and empathy for students as described above in line with the implications of poor Mathematics learning readiness. In developing discrepancy, the researcher is not setting out to convey to the learners the impression that “you are a loser because you fail Mathematics,” but rather to reflect the student’s own stated concerns of how his or her poor learning readiness interfere with goal attainment. The

researcher found that many youths do not have expressed goals, especially beyond the immediate future as a result of poor Mathematics learning readiness. With these learners were able to verbalize specific goals and eliminate vague belief that Mathematics is difficult and invariably develop effective learning readiness.

Assignment

- Participants were given home work to develop strategies through which discrepancy in Mathematics learning readiness could be achieved.

Closing Remarks

- The researcher commended the participants for their cooperation.
- The participants were reminded to do their homework.
- The participants were intimated with the time and venue for the next session.

Session 7:

Topic: Supporting Self-Efficacy

Objectives: At the end of this session the following should be attained:

- The participants should be able to define what relationship is.
- They should be able to state and explain the self-efficacy support and how it can affect their Mathematics learning readiness.
- They should be able to develop strategies through which self-efficacy support could be attained with their classmates, teachers and other members of the school.

Activity

- The participants were welcomed warmly. The researcher reviewed the previous homework with the participants.
- The researcher defined the relationship and explained the self-efficacy support with respect to how it could affect or influence their Mathematics learning readiness. This MET strategy refers to helping develop and support the client's belief that he/she can achieve change in learning Mathematics. This is important because people who believe that Mathematics is difficult are still unlikely to move toward change unless there is hope for success through learning readiness. Even if the students acknowledges that Mathematics failure is a problem, he or she may be disinclined to improve on Mathematics learning readiness and attitude without the belief that he or she can be successful in making that change to enhance Mathematics learning readiness. The researcher role is to help learners to develop and/or

strengthen the sense of self-efficacy that they can in fact improve their Mathematics learning readiness. In order to support self-efficacy, the researcher ask clients about previous successful experiences they have had in the following areas: previous periods of improved Mathematics readiness, earlier success in Mathematics achievement and past accomplishment in gaining control over another problematic habit in life. Some students may not make the connection between these previous accomplishments and the likelihood that they will be successful in meeting their goal regarding Mathematics learning readiness.

Closing Remarks

- The researcher commended the participants for their cooperation so far.
- The participants were reminded of the time and venue for the next session.

Session 8

Topic: Overall Review, Post-Experiment Test Administration and Conclusion

Objectives: At the end of the session, the participants should be able to:

- Summarise their experience based on what they have benefited from the various skills they have learnt since the commencement of the programme.
- Respond to the post-test instruments.

Activity

- The participants were warmly welcomed and the home work was reviewed together with the researcher.
- This was an interactive session between the researcher and the participants to ascertain the effect of the therapeutic programme. Activities of the previous sessions were role-played to be sure they have attained positive experience via the intervention.
- The participants were administered post-test instruments. The researcher then thanked the participants for their co-operation while a token gift was given to each one of them in appreciation of their participation in the trainingme.

Closing Remarks

- The researcher commended the participants for their unrelenting cooperation.
- The participants were encouraged to utilize effectively the skills they have acquired via the intervention programme.

EXPERIMENTAL GROUP 1 (MOTIVATIONAL ENHANCEMENT THERAPY FOR MATHEMATICS LEARNING GAINS)

Session 1

Topic: General Introduction and Administration of Instrument to obtain Pre-test Scores

The purpose of this session is to administer Mathematics learning gains test (MLGT) so as to determine the status of participants before the treatment programme, regarding their current learning gains in Mathematics.

Activity

- The researcher warmly welcomed the participants into the programme.
- The researcher explained the reason for the programme and the benefit attached at the end of the programme.
- The researcher also explained the rules guiding the conduct of the programme and what is expected of the participants.
- The researcher administered the pre-test instruments to the participants.
- The participants were given a take home assignment to identify different factors that contribute to poor Mathematics learning gains in the school.

Closing Remarks:

- The participants were commended for their cooperation and encouraged to do their homework.
- They were also reminded of the time and venue for the next session.

Session 2

Topic: The Meaning and Stages of Motivational Enhancement Therapy

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

- Issues and problems of Mathematics learning gains
- Explain the meaning of Motivational Enhancement Therapy
- Identify the different therapeutic strategies of Motivational Enhancement Therapy

Activity

- The participants were welcomed warmly.
- The researcher also reviewed the assignment with the participants and provided accurate empathy for the students on Mathematics learning gains.
- Issues and problems of Mathematics learning gains as: Learning gains also refers to the learning gains of objectives described in the curriculum of an educational program. Focus of

an educational system is mostly on the objectives. Learning gains is closely related with the concept of learning. However, learning gains has wider meaning as compared to learning. Learning is defined as an enduring change in the mechanisms of behaviour involving specific stimuli and responses that result from prior experience with those or similar stimuli and responses. Learning gains of students in Nigeria has been and is still a source of concern and research interest to educators, government and parents. This is so because of the great importance that education has on the national development of the country. All over the country, there is a consensus of opinion about the fallen standard of education in Nigeria. Parents and government are in total agreement that their huge investment on education is not yielding the desired dividend. Teachers also complain of students' low performance at both internal and external examination. The annual releases of Senior Secondary Certificate Examination results (SSCE) conducted by West African Examination Council (WAEC) justified the problematic nature and generalization of poor secondary school students' performance in different school subjects.

- The researcher explained the meaning of motivational enhancement therapy to the participants in relation to Mathematics learning gains as thus:
- Motivational enhancement therapy, also known as motivational interviewing therapy, is a Motivational enhancement therapy is a therapeutic approach based on the premise that students will best be able to achieve change when motivation comes from within themselves, rather than being imposed by the therapist. Motivational interviewing, the primary element of MET, was developed by Miller and Rollnick (1991). It is a trans-theoretical model derived from a number of sources; including stages of change theory, client-centered approaches, and research into what clinician behaviour are associated with the best Mathematics learning gains.

Type of Marking

- Method Markings (M) are given for the use of correct method. The correct method should lead for the correct answer if numerical errors or miscalculation are not committed
- Accuracy Markings (A) are earned when the answer is correct as given in the marking scheme. When the method mark is zero, the immediate accuracy marks are also lost
- Bonus Markings (B) are awarded for correct accuracy marks which are not preceded by method marks. Bonus marks combine both method and accuracy marks together

- Follow through bonus marks (B) are awarded in special situations where the candidates' wrong values are used correctly in the subsequent working. E.g plotting of the candidates wrong values are used correctly in drawing a graph
- The M, A and B marks cannot be split or subdivided. E.g where an M₂ is allocated the candidate either scores the M₂ fully (if the method is correct) or M₀ (if the method is wrong). The same applied to the A and B marks. The therapy is based on its core principle of learning processes. Therapeutic Strategies of Motivational Enhancement Therapy are:
 - Learning Environmental mastery
 - Personal Growth and Objectives in Learning
 - Express of Urge and Motives
 - Develop Discrepancy
 - Support Self-Efficacy

As a take home assignment, participants were asked to write out what they understand by the term Motivational Enhancement therapy and its strategies.

Closing Remarks:

- The researcher commended the participants for their cooperation.
- The participants were reminded to do their homework
- They were intimated also with the time and venue for the next session.

Session 3

Topic: Learning Environmental Mastery

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

- Explain learning Environmental mastery

Activity

- The participants were welcomed warmly
- The researcher reviewed the assignment with the participants.
- He also explained to participants the meaning of environmental mastery and presented likely examples as thus:

Learning environmental mastery is the ability of a student to have a sense of mastery and competence in managing the learning environment; controls external activities; makes effective use of surrounding opportunities; able to create or choose contexts suitable to personal learning needs and values. The therapist explain further that students who do not have sense of

learning environmental mastery often feel that nothing good can come out of their Mathematics learning gains, they express feelings like; I am not hate Mathematics, I am a failure of Mathematics, Mathematics topics are difficult e.t.c. This lack of sense of control in learning environment leads the client to miss surrounding opportunities with the possibility of subsequent regret over their learning gains in Mathematics. Consideration is here given to the environment of study as it appears to have adverse effect on the whole attitude and Mathematics learning gains. Where one studies has an important effect on one's efficiency because the location and all of its characteristics are stimuli. The stimulus of the study situation should produce the response of studying and no other response. It has been suggested that an important approach is to have a set aside specifically for study. It should be well ventilated, noise free and well lighted room or open place with a desk and a chair to enhance Mathematics learning gains. Ruch (1995) wrote on the need to consider the type of chair and desk used for study in order to improve Mathematics learning gains. These should be such that allow the individual to maintain an erect and mental capacity to the acquisition, understanding and organisation of knowledge; it often involves and improves Mathematics learning gains forms.

Assignment

- As a take home assignment, participants were asked to write out what they understand by the term learning environmental mastery.

Closing Remarks:

- The researcher commended the participants for their time and cooperation.
- The participants were reminded to do their homework.
- Time and venue for the next session were made known to the participants.

Session 4

Topic: Developing Personal Growth and Objectives with learning gains

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

- Define personal growth.
- Be able to identify and define their objectives in line with learning gains

Activity

- Participants were welcomed warmly
- The researcher reviewed the assignment with the participants

The researcher also explained learning gains as appropriate to be used in term of student academic achievement in science and Mathematics. This is because it is well believed that learning has not being taken place if the learners have not been able to achieve or gains from the teaching instructions of the teacher. But the level at which the students gains is what is always differs and make the stakeholder to carryout consistent research to find out like problems associated with poor learning gains among the students. Learning gains of students in Nigeria has been and is still a source of concern and research interest to educators, government and parents. This is so because of the great importance that education has on the national development of the country. Personal growth deals with the students having the ideas of approaches towards which Mathematics could be tackled and solved. The approaches include: unimodal (using specific methods), amodal (without specific method) and multimodal (using more than one methods in solving a given questions). It has very serious implications for the learner, the teacher, the immediate social group with which the individual learner relates and the entire school system. The students have goals in learning and sense of direction; feeling that there is meaning to present and past life learning gains in Mathematics; holds beliefs that give aims and objectives for learning Mathematics. This approach is basically resident in the therapist rather than the participants.

Closing Remarks:

- The researcher commended the participants for their cooperation.
- The participants were reminded to do their homework
- They were reminded of the time and venue for the next session.

Assignment

- As a take home assignment, participants were asked to identify their personal growth and enumerate their potentials in Mathematics learning gains.

Session 5:

Topic: Express of Urge and Motives

Objectives: The following objectives are expected to be achieved at the end of this session:

- The participants should be able to explain the meaning of urge and motive.
- They should be able to evaluate developed urge and motives in relation to Mathematics learning gains.

Activity

- The participants were warmly welcomed and the researcher reviewed home work of the previous session with them.
- The researcher explained that a student who has urge and motive is an individual who is self-determined to learn irrespective of the conditions/situation; able to resist to solving problems; regulates behaviour from within; evaluates self by personal acceptance. Motive has received much attention from many researchers with different psychological and philosophical perspectives in different fields of study, especially psychology and education due to its significant effect on students' learning, persistence and academic achievement. It has been operationalized from the perspective of different theoretical approaches over the past decades. For instance, acceptance implies that good interaction and relationship between the teachers and learners are important aspect of Mathematics learning gains. This treatment approach is not based on confrontation of superiority or inferiority but rather student-teacher relationship. It is important that the learners should not give the impression that Mathematics procedure is too long or cumbersome but rather master the approaches and procedure. Much of MET is listening rather than telling/thinking. Empathic listening and accurate reflection are crucial to facilitating change and learning gains in Mathematics. If learners feel that they are truly understood and accepted the procedure, they will be increasingly open to viewing the teachers as a valid consultant to their personal change process.

Assignment

- As a take home assignment, participants were asked to explain the meaning of urge and motive and its relevance to Mathematics learning gains

Closing Remarks:

- The researcher commended the participants for their cooperation.
- The participants were reminded to do their homework
- They were intimated with the time and venue for the next session.

Session 6:

Topic: Develop Discrepancy

Objectives: At the end of this session the following should be attained:

- The participants should be able to understand how to develop discrepancy

- They should be able to develop appropriate discrepancy strategies in collaboration with Mathematics learning gains

Activity

- The participants were appreciated for coming and their homework was reviewed by the researcher.
- The researcher explained the meaning and strategies of developing discrepancy, stating clearly that such students who develop discrepancy; accepts his/her good and bad qualities; feels positive about past life in learning will have an improved Mathematics learning gains. However, Motivation for change occurs when people perceive a discrepancy between where they are and where they want to be. In employing this MET strategy, the researcher helps learners to recognize the discrepancy between the effects of poor Mathematics learning gains on their lives now and how they would like their lives to be. Awareness of this discrepancy may well drive the desire for change. Here, again, the researcher needs to convey the same respect and empathy for students as described above in line with the implications of poor Mathematics learning gains. In developing discrepancy, the researcher is not setting out to convey to the learners the impression that “you are a loser because you fail Mathematics,” but rather to reflect the student’s own stated concerns of how his or her poor learning gains interfere with goal attainment. The researcher found that many youths do not have expressed goals, especially beyond the immediate future as a result of poor Mathematics learning gains. With these learners were able to verbalize specific goals and eliminate vague belief that Mathematics is difficult and invariably develop effective learning gains.

Assignment

- Participants were given home work to develop strategies through which discrepancy in Mathematics learning gains could be achieved.

Closing Remarks

- The researcher commended the participants for their cooperation.
- The participants were reminded to do their homework.
- The participants were intimated with the time and venue for the next session.

Session 7:

Topic: Supporting Self-Efficacy

Objectives: At the end of this session the following should be attained:

- The participants should be able to define what relationship is.
- They should be able to state and explain the self-efficacy support and how it can affect their Mathematics learning gains.
- They should be able to develop strategies through which self-efficacy support could be attained with their classmates, teachers and other members of the school.

Activity

- The participants were welcomed warmly. The researcher reviewed the previous homework with the participants.
- The researcher defined the relationship and explained the self-efficacy support with respect to how it could affect or influence their Mathematics learning gains. This MET strategy refers to helping develop and support the client's belief that he/she can achieve change in learning Mathematics. This is important because people who believe that Mathematics is difficult are still unlikely to move toward change unless there is hope for success through learning gains. Even if the students acknowledges that Mathematics failure is a problem, he or she may be disinclined to improve on Mathematics learning gains and attitude without the belief that he or she can be successful in making that change to enhance Mathematics learning gains. The researcher role is to help learners to develop and/or strengthen the sense of self-efficacy that they can in fact improve their Mathematics learning gains. In order to support self-efficacy, the researcher ask clients about previous successful experiences they have had in the following areas: previous periods of improved Mathematics readiness, earlier success in Mathematics achievement and past accomplishment in gaining control over another problematic habit in life. Some students may not make the connection between these previous accomplishments and the likelihood that they will be successful in meeting their goal regarding Mathematics learning gains.

Closing Remarks

- The researcher commended the participants for their cooperation so far.
- The participants were reminded of the time and venue for the next session.

Session 8

Topic: Overall Review, Post-Experiment Test Administration and Conclusion

Objectives: At the end of the session, the participants should be able to:

- Summarise their experience based on what they have benefited from the various skills they have learnt since the commencement of the programme.
- Respond to the post-test instruments.

Activity

- The participants were warmly welcomed and the home work was reviewed together with the researcher.
- This was an interactive session between the researcher and the participants to ascertain the effect of the therapeutic programme. Activities of the previous sessions were role-played to be sure they have attained positive experience via the intervention.
- The participants were administered post-test instruments. The researcher then thanked the participants for their co-operation while a token gift was given to each one of them in appreciation of their participation in the trainingme.

Closing Remarks

- The researcher commended the participants for their unrelenting cooperation.
- The participants were encouraged to utilize effectively the skills they have acquired via the intervention programme.

EXPERIMENTAL GROUP 2 (SELF-MONITORING SKILL TRAINING FOR MATHEMATICS LEARNING READINESS)

Session 1

Topic: Pre-test administration

The purpose of this session is to administer Mathematics learning readiness scale (MLRS), Mathematics anxiety as well as attitude to Mathematics scale (AMS) so as to determine the students who were able to benefit and participate in the training. Also, the administration of these instruments demonstrates the present situational level of the participants regarding the dependent variable (Mathematics learning readiness) and moderating variables (Mathematics anxiety and gender make-up).

Activity

- The researcher warmly welcomed the participants into the programme. Participants were informed that they will be having eight (8) sessions of 1 hour 20 Minutes each for a period of eight weeks.
- The researcher explained the reason for the programme and the benefit attached at the end of the programme.
- The researcher also explained the rules guiding the conduct of the programme and what is expected of the participants.
- The researcher administered the pre-test instruments to the participants.
- The participants were given a take home assignment to identify different factors that contribute to poor Mathematics learning readiness in the school.

Closing Remarks:

- The participants were commended for their cooperation and encouraged to do their homework.
- They were also reminded of the time and venue for the next session.

Session 2

Topic: The Meaning of Self-Monitoring Skill Training

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

- Discuss the problems and Challenges of Mathematics learning readiness
- Appreciate the meaning of Self-Monitoring Training

Activity

- The participants were welcomed warmly
- The researcher reviewed the assignment with the participants

Problems and Challenges of Mathematics learning readiness as follow: Learning is an essential component of academic learning readiness and gains but every type of learning is not necessarily included in learning readiness and gains. Learning could be in any direction; positive or negative, intentional or accidental. However, learning gains is necessarily positive with reference to the objectives of the study, intentional and outcome of an instructional program. Good academic learning gains is very important not only to students and their parents, but also to institutions of learning, educationists of any progressive nation and other stakeholders. Resultantly much concern is being expressed over the continuous poor academic

performance of students in Nigeria, particularly of secondary school students. Several researchers have recommended incorporating readiness toward learning or the subject matter into studies of cognition and learning gains.

He also explained to the participants what self- monitoring training means as thus: Self-monitoring training (SMT) is defined as two-stage process that involves observing and recording. The student needs to determine if the target behaviour did or did not occur. Then, the student self-records some feature of the target behaviour. He/she can either record the number of occurrences of a target behaviour to be decreased (e.g., getting out of one's seat) or to be increased (e.g., time on task). Then the student and teacher together determine an acceptable number of occurrences and reinforcement for obtaining the agreed upon number. Sometimes the simple act of recording increases awareness enough to modify the behaviour; in other cases, the reinforcer is critical in reducing or increasing the occurrence of behaviour.

- As a take home assignment, the participants were asked to write out what they understand by the term self- monitoring training.

Closing Remarks:

- The researcher commended the participants for their cooperation.
- The participants were reminded to do their homework
- The participants were intimated with the time and venue for the next session.

Session 3

Topic: Processes of Self- monitoring Training

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

- State the processes of self- monitoring training in relation with Mathematics Learning Readiness

Activity

- The participants were welcomed warmly
- The researcher reviewed the assignment with the participants
- The researcher also explained learning readiness as concept that is concerned with an individual way of thinking, acting and behaving toward object or subject. It has very serious implications for the learner, the teacher, the immediate social group with which the individual learner relates and the entire school system. Readiness is formed as a result of some kind of learning experiences. They may also be learned simply by following the

example or opinion of parent, teacher or friend. Many students do not seek to understand the basic concepts in Mathematics that seem simple and relevant but later in their studies they realize that without learning those so call basics concepts adequately, the comprehension of more difficult and complex materials will definitely be difficult. Students complain that they do not understand what they have read. It is suggested that students need to follow these processes with the cited cases and examples for them to comprehend more Mathematical concepts and questions. This approach is basically resident in the participants rather than the therapist.

- The researcher explained to the participants, the different processes involved in self-monitoring training as thus: self-control, self-observation, task analysis, self-motivation beliefs, self-judgment, self-reaction, time management and organisation e.t.c.

Closing Remarks:

- The researcher commended the participants for their time and effort.
- The participants were reminded to do their homework
- The participants were reminded of the time and venue for the next session.

Session 4

Topic: Task Analysis

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

- Explain task analysis in relation to Mathematics learning readiness.
- Identify the two stages of task analysis.
- Explain Goal Setting.
- Explain Strategic Planning.
- As a take home assignment, the participants were asked to plan their academic work and set achievable goals on a particular course against the next meeting.

Activity

- The participants were welcomed warmly.
- The researcher reviewed the assignment with the participants.
- The researcher explained task analysis to involve goal setting and strategic planning for learning Mathematics. There is considerable evidence of increased academic success by learners who set specific goals for themselves in learning, such as memorizing formulae for solving Mathematics questions and by learners who plan to use mnemonics or proving, such as segmenting words into syllables. A very effective technique in solving a given question in

Mathematics is to study the formulae or diagram as the case may be for a given period of time. Try to reproduce it immediately and then later at increasing intervals of time, for example, every day for a week and then every week for a month. This method is known as task analysis and has been found to be very useful.

Closing Remarks:

- The researcher commended the participants for their time and effort.
- The participants were reminded to do their homework
- They were intimated with the time and venue for the next session.

Session 5

Topic: Time management and Organisation

Objectives: The following objectives are expected to be achieved at the end of this session:

- The participants should be able to explain the meaning of time.
- The participants should be able to explain how time could be managed
- The participants should be able to know and develop adequate time management skills as essential for the Mathematics learning readiness.

Activity

Step 1: The participants were warmly welcomed and the researcher will review home work of the previous session with them.

The researcher explained time management as the process of planning and exercising conscious control over the amount of time spent on specific activities especially to increase effectiveness, efficiency or productivity. Time management skills include: listing all current tasks, putting it on paper to start to get things back under control, developing a flexible personal time table, prioritizing academic activities, identifying helpful resources, using free time wisely, seeking dedicated study environment, avoiding distraction, using deadlines and word counts to achieve a task and avoiding complex organisational activities.

Effective time management is an essential component of the independent study expected in secondary education. Failure to manage time in order to complete and submit assignments and prepare for assessment can create problems for retention and Mathematics learning readiness. In addition, poor time management can be a major source of stress and anxiety and creating pressure on students. Organizing time in this way helps to minimize worry and indecision that may arise in case of any extra work that has to be slotted in, the diary should be planned on the basis of needs and purposes; allocating adequate time to each task so that no

particular task consume more time than necessary. Whatever time a student spends on study, what time of the day he sets aside for work only by organizing and planning their time that student can avoid distraction from regular studies. Determining time limits for study sets the immediate goal for completing ones work within specific time limits and also helps one to resist recreational distraction towards Mathematics learning readiness.

As a take home assignment, the participants were asked to develop a personal time table each for their academic activities and enhance their Mathematics learning readiness.

Closing Remarks:

- The researcher commended the participants for their time and cooperation.
- The participants were reminded to do their homework.
- They were also reminded of the time and venue for the next session.

Session 6:

Topic: Self-reflection

Objectives: At the end of this session the following should be attained:

- The participants should be able to explain self-judgment in line with Mathematics learning readiness.
- They should be able to explain self-reaction in collaboration with Mathematics learning readiness.
- They should be able to explain self-evaluation as significant to Mathematics learning readiness.

Activity

Step 1: The participants were warmly welcomed and the researcher reviewed home work of the previous session with them.

Step 2: The researcher explained that there are two major classes of self-reflection phase processes: self-judgment and self-reaction. One form of self-reflection, self-reaction refers to comparison of self-observed performances against some standards, such as one's prior performance, another person's performance, or an absolute standard of performance and Mathematics learning readiness. Another form of self-reflection which is self-judgment involves causal attribution, which refers to beliefs about the cause of one's errors or successes, such as a score on a Mathematics test and Mathematics learning readiness. Self-reflection when properly done involves not only reading and writing or listening to lectures

and jotting down points but also requires concentration and reading out for necessary facts. It may not be as easy as it seem to be the observer. It involves the thought and hearing ability of the individual towards Mathematics.

Step 4: The participants were given a home work to write out how they judge and evaluate themselves towards Mathematics learning readiness.

Closing Remarks

- The researcher commended the participants for their time and effort.
- The participants were reminded to do their homework
- They were reminded of the time and venue for the next session.

Session 7

Topic: Behaviour Modification

Objectives: At the end of the session the participants should be able to:

- Develop positive attitude toward their academic pursuit and avoid poor learning readiness.
- Set up realistic and achievable goals, plans and tasks hence, manage their problem solving skill tendencies. Behaviour is any activity that can be observed, measured and recorded. Behaviour is caused. What a child does, he does for a reason. Behaviour is the result of the action between environment and the child's growing self. Behaviour includes 'all those aspects of human activity which we can observe'. He does not however exclude behaviour that are not observable hence he went further to involve personal experience which can only be studied by asking individuals to express their 'feelings and thoughts' as part of behaviour. Before any behaviour modification is attempted, it is however necessary for the manipulator of the experiment to have a detailed knowledge of the type and frequency of the deviant behaviour needed to be eliminated from the child or the person concerned. For example, if a child is observed to rise from his seat and run to some other child frequently during the lesson hour, then the 'baseline' or operant level of this deviant behaviour of the child has to be determined first. That means the number of times per lesson hour during the morning, for example, the child rises from his seat, and manifests this disturbing behaviour. This has to be assessed to determine the frequency and nature of this distracting behaviour towards Mathematics learning readiness. Then the next step is to determine the 'terminal behaviour' wanted to be seen in the behaviour manifestations of the child or the person concerned.

Activity

Step 1: The participants were welcomed warmly and together with the researcher, home work of the last meeting was reviewed.

Step 2: The participants were taught the need to develop positive attitude toward learning Mathematics.

Step 3: The participants were also encouraged to set up realistic and achievable goals rather than unrealistic ones.

- As a take home assignment, the participants were asked to.

Closing Remarks

- The researcher commended the participants for their cooperation.
- The participants were reminded to do their homework,
- The participants were intimated with the time and venue for the next session.

Session 8

Topic: Overall review, Post-Experiment Test Administration and Conclusion.

Objectives: At the end of the session, the participants should be able to:

- Summarize their experience based on what they have benefited from the various skills they have learnt since the commencement of the programme.
- Respond to the post-test instruments.

Activity

Step 1: The participants were warmly welcomed and the home work was reviewed together with the researcher.

Step 2: This was an interactive session between the researcher and the participants to ascertain the effect of the therapeutic programme. Activities of the previous sessions were role-played to be sure they have attained positive experience via the intervention.

The participants were administered post-test instruments. The researcher then thanked the participants for their co-operation while a token gift was given to each one of them in appreciation of their participation in the trainingme.

Closing Remarks

- The researcher commended the participants for their unrelenting cooperation.
- The participants were encouraged to utilize effectively the skills they have acquired via the intervention programme.

EXPERIMENTAL GROUP 2 (SELF-MONITORING SKILL TRAINING FOR MATHEMATICS LEARNING GAINS)

Session 1

Topic: Pre-test administration

The purpose of this session is to administer the research Mathematics learning gains test (MLGT) so as to determine the status of participants before the treatment programme, regarding their current learning gains in Mathematics.

Activity

- The researcher warmly welcomed the participants into the programme.
- The researcher explained the reason for the programme and the benefit attached at the end of the programme.
- The researcher also explained the rules guiding the conduct of the programme and what is expected of the participants.
- The researcher administered the pre-test instruments to the participants.
- The participants were given a take home assignment to identify different factors that contribute to poor Mathematics learning gains in the school.

Closing Remarks:

- The participants were commended for their cooperation and encouraged to do their homework.
- They were also reminded of the time and venue for the next session.

Session 2

Topic: The Meaning of Self-Monitoring Skill Training

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

- Problems and challenges of Mathematics learning gains
- The meaning of Self-Monitoring Skill

Activity

- The participants were welcomed warmly
- The researcher reviewed the assignment with the participants
- Problems and challenges of Mathematics learning gains as: Learning gains also refers to the learning gains of objectives described in the curriculum of an educational program. Focus of an educational system is mostly on the objectives. Learning gains is closely related with the

concept of learning. However, learning gains has wider meaning as compared to learning. Learning is defined as an enduring change in the mechanisms of behaviour involving specific stimuli and responses that result from prior experience with those or similar stimuli and responses (Adejumo, Oluwole & Muraina, 2015; Busari, 2013). Learning gains of students in Nigeria has been and is still a source of concern and research interest to educators, government and parents. This is so because of the great importance that education has on the national development of the country. All over the country, there is a consensus of opinion about the fallen standard of education in Nigeria (Adebule, 2004). Parents and government are in total agreement that their huge investment on education is not yielding the desired dividend. Teachers also complain of students' low performance at both internal and external examination. The annual releases of Senior Secondary Certificate Examination results (SSCE) conducted by West African Examination Council (WAEC) justified the problematic nature and generalization of poor secondary school students' performance in different school subjects.

- He also explained to the participants what self- monitoring training means as thus:

Self-monitoring training (SMT) is defined as two-stage process that involves observing and recording. The student needs to determine if the target behaviour did or did not occur. Then, the student self-records some feature of the target behaviour. He/she can either record the number of occurrences of a target behaviour to be decreased (e.g., getting out of one's seat) or to be increased (e.g., time on task). Then the student and teacher together determine an acceptable number of occurrences and reinforcement for obtaining the agreed upon number. Sometimes the simple act of recording increases awareness enough to modify the behaviour; in other cases, the reinforcer is critical in reducing or increasing the occurrence of behaviour.

- As a take home assignment, the participants were asked to write out what they understand by the term self- monitoring training.

Closing Remarks:

- The researcher commended the participants for their cooperation.
- The participants were reminded to do their homework
- The participants were intimated with the time and venue for the next session.

Session 3

Topic: Processes of Self- monitoring Training

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

- State the processes of self- monitoring training in relation with Mathematics Learning gains

Activity

- The participants were welcomed warmly
- The researcher reviewed the assignment with the participants
- The researcher also explained learning gains as concept that is concerned with the student academic achievement in science and Mathematics. This is because it is well believed that learning has not being taken place if the learners have not been able to achieve or gains from the teaching instructions of the teacher. But the level at which the students gains is what is always differs and make the stakeholder to carryout consistent research to find out like problems associated with poor learning gains among the students. Learning gains of students in Nigeria has been and is still a source of concern and research interest to educators, government and parents. This is so because of the great importance that education has on the national development of the country. Many students do not seek to understand the basic concepts in Mathematics that seem simple and relevant but later in their studies they realize that without learning those so call basics concepts adequately, the comprehension of more difficult and complex materials will definitely be difficult. Students complain that they do not understand what they have read. It is suggested that students need to follow these processes with the cited cases and examples for them to comprehend more Mathematical concepts and questions. This approach is basically resident in the participants rather than the therapist.
- The researcher explained to the participants, the different processes involved in self-monitoring training as thus: self-control, self-observation, task analysis, self-motivation beliefs, self-judgment, self-reaction, time management and organisation e.t.c.

Closing Remarks:

- The researcher commended the participants for their time and effort.
- The participants were reminded to do their homework
- The participants were reminded of the time and venue for the next session.

Session 4

Topic: Task Analysis

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

- Explain task analysis in relation to Mathematics learning gains.
- Identify the two stages of task analysis.
- Explain Goal Setting.
- Explain Strategic Planning.
- As a take home assignment, the participants were asked to plan their academic work and set achievable goals on a particular course against the next meeting.

Activity

- The participants were welcomed warmly.
- The researcher reviewed the assignment with the participants.
- The researcher explained task analysis to involve goal setting and strategic planning for learning Mathematics. There is considerable evidence of increased academic success by learners who set specific goals for themselves in learning, such as memorizing formulae for solving Mathematics questions and by learners who plan to use mnemonics or proving, such as segmenting words into syllables. A very effective technique in solving a given question in Mathematics is to study the formulae or diagram as the case may be for a given period of time. Try to reproduce it immediately and then later at increasing intervals of time, for example, every day for a week and then every week for a month. This method is known as task analysis and has been found to be very useful.

Some Penalties during Mathematics Marking

- Deduction of Marks: Marks are deducted from the candidates work as follows:
- Deduct 1 mark for wrong units (W.U) or omitted (O.R) once only in a questions
- Deduct 1 mark for wrong reason (W.R) or omitted (O.R) in geometric proofs once only in a questions
- Deduct 2 marks for misreading (M.R) the data in question (if the misread values are used correctly in the subsequent calculation)
- Deduct 1 mark for premature approximation which does not make the subsequent working considerably easier
- Deduct 1 mark for the omission of an essential working

- Marks can only be deducted from accuracy and bonus marks and not from method marks
- Certain deductions are specifically stated in some questions in the marking scheme. E.g ½ each or -1 error
- Award zero mark if candidate's work is not clearly presented indecipherable or working totally suppressed

Closing Remarks:

- The researcher commended the participants for their time and effort.
- The participants were reminded to do their homework
- They were intimated with the time and venue for the next session.

Session 5

Topic: Time management and Organisation

Objectives: The following objectives are expected to be achieved at the end of this session:

- The participants should be able to explain the meaning of time.
- The participants should be able to explain how time could be managed
- The participants should be able to know and develop adequate time management skills as essential for the Mathematics learning gains.

Activity

Step 1: The participants were warmly welcomed and the researcher will review home work of the previous session with them.

The researcher explained time management as the process of planning and exercising conscious control over the amount of time spent on specific activities especially to increase effectiveness, efficiency or productivity. Time management skills include: listing all current tasks, putting it on paper to start to get things back under control, developing a flexible personal time table, prioritizing academic activities, identifying helpful resources, using free time wisely, seeking dedicated study environment, avoiding distraction, using deadlines and word counts to achieve a task and avoiding complex organisational activities.

Effective time management is an essential component of the independent study expected in secondary education. Failure to manage time in order to complete and submit assignments and prepare for assessment can create problems for retention and Mathematics learning gains. In addition, poor time management can be a major source of stress and anxiety and creating pressure on students. Organizing time in this way helps to minimize worry and indecision that may arise in case of any extra work that has to be slotted in, the diary should be planned on the

basis of needs and purposes; allocating adequate time to each task so that no particular task consume more time than necessary. Whatever time a student spends on study, what time of the day he sets aside for work only by organizing and planning their time that student can avoid distraction from regular studies. Determining time limits for study sets the immediate goal for completing ones work within specific time limits and also helps one to resist recreational distraction towards Mathematics learning gains.

As a take home assignment, the participants were asked to develop a personal time table each for their academic activities and enhance their Mathematics learning gains.

Closing Remarks:

- The researcher commended the participants for their time and cooperation.
- The participants were reminded to do their homework.
- They were also reminded of the time and venue for the next session.

Session 6:

Topic: Self-reflection

Objectives: At the end of this session the following should be attained:

- The participants should be able to explain self-judgment in line with Mathematics learning gains.
- They should be able to explain self-reaction in collaboration with Mathematics learning gains.
- They should be able to explain self-evaluation as significant to Mathematics learning gains.

Activity

Step 1: The participants were warmly welcomed and the researcher reviewed home work of the previous session with them.

Step 2: The researcher explained that there are two major classes of self-reflection phase processes: self-judgment and self-reaction. One form of self-reflection, self-reaction refers to comparison of self-observed performances against some standards, such as one's prior performance, another person's performance, or an absolute standard of performance and Mathematics learning gains. Another form of self-reflection which is self-judgment involves causal attribution, which refers to beliefs about the cause of one's errors or successes, such as a score on a Mathematics test and Mathematics learning gains. Self-reflection when properly done involves not only reading and writing or listening to lectures and jotting down points

but also requires concentration and reading out for necessary facts. It may not be as easy as it seem to be the observer. It involves the thought and hearing ability of the individual towards Mathematics.

Step 4: The participants were given a home work to write out how they judge and evaluate themselves towards Mathematics learning gains.

Closing Remarks

- The researcher commended the participants for their time and effort.
- The participants were reminded to do their homework
- They were reminded of the time and venue for the next session.

Session 7

Topic: Behaviour Modification

Objectives: At the end of the session the participants should be able to:

- Develop positive attitude toward their academic pursuit and avoid poor learning gains.
- Set up realistic and achievable goals, plans and tasks hence, manage their problem solving skill tendencies. Behaviour is any activity that can be observed, measured and recorded. Behaviour is caused. What a child does, he does for a reason. Behaviour is the result of the action between environment and the child's growing self. Behaviour includes 'all those aspects of human activity which we can observe'. He does not however exclude behaviour that are not observable hence he went further to involve personal experience which can only be studied by asking individuals to express their 'feelings and thoughts' as part of behaviour. Before any behaviour modification is attempted, it is however necessary for the manipulator of the experiment to have a detailed knowledge of the type and frequency of the deviant behaviour needed to be eliminated from the child or the person concerned. For example, if a child is observed to rise from his seat and run to some other child frequently during the lesson hour, then the 'baseline' or operant level of this deviant behaviour of the child has to be determined first. That means the number of times per lesson hour during the morning, for example, the child rises from his seat, and manifests this disturbing behaviour. This has to be assessed to determine the frequency and nature of this distracting behaviour towards Mathematics learning gains. Then the next step is to determine the 'terminal behaviour' wanted to be seen in the behaviour manifestations of the child or the person concerned.

Activity

Step 1: The participants were welcomed warmly and together with the researcher, home work of the last meeting was reviewed.

Step 2: The participants were taught the need to develop positive attitude toward learning Mathematics.

Step 3: The participants were also encouraged to set up realistic and achievable goals rather than unrealistic ones.

- As a take home assignment, the participants were asked to.

Closing Remarks

- The researcher commended the participants for their cooperation.
- The participants were reminded to do their homework,
- The participants were intimated with the time and venue for the next session.

Session 8

Topic: Overall review, Post-Experiment Test Administration and Conclusion.

Objectives: At the end of the session, the participants should be able to:

- Summarize their experience based on what they have benefited from the various skills they have learnt since the commencement of the programme.
- Respond to the post-test instruments.

Activity

Step 1: The participants were warmly welcomed and the home work was reviewed together with the researcher.

Step 2: This was an interactive session between the researcher and the participants to ascertain the effect of the therapeutic programme. Activities of the previous sessions were role-played to be sure they have attained positive experience via the intervention.

The participants were administered post-test instruments. The researcher then thanked the participants for their co-operation while a token gift was given to each one of them in appreciation of their participation in the trainingme.

Closing Remarks

- The researcher commended the participants for their unrelenting cooperation.
- The participants were encouraged to utilize effectively the skills they have acquired via the intervention programme.

CONTROL GROUP

Session 1

Topic: Administration of pre-test instrument

Objective: To administer pre-test instruments to the participants.

Activity: The researcher familiarized with the members of the group. The researcher also explained to participants that the programme is mainly for research purpose only and that their support and co-operation is highly needed. The pre-test instruments were administered on the participants.

Closing Remarks

- The researcher commended the participants for their time and effort.
- The participants were reminded of the time and venue of the next session.

Session 2:

Topic: Education and Sustainable Development

Objectives: The following objectives are expected to be achieved at the end of this session:

- The participants should be able to define what is Education?
- The participants should be able to define what is Sustainable Development?
- They should be able to state how education contribute to sustainable development

Activity

- The participants were warmly welcomed and the researcher gradually introduced the topic Education as a concept
- The researcher defined the sustainable development as series of advancement, standard and improvement that could occur in any nation.
- The researcher began with explanation on the nature of sustainable development and proceeds therefore with a survey of basic issues that might contribute to sustainable development in any nation. **As follow:**

Education as a concept is difficult to pin down to a particular definition. This is because the term is too elusive and ephemeral depending on the purpose and people. Thus, the concept has been viewed in different ways by different authors, scholars, educators and researchers. Experiences and observations have shown that there are one thousand and one definitions of Education. Education is the aggregate of all the process by which a child or young adult develops the abilities, attitudes and other forms of behaviour which are of positive values to the

society in which he lives. Education is the leading out of the inborn powers and potentials on an individual in the society and the acquisition of skills, aptitudes and completeness necessary for self-actualization. Education is the process of cultural transmission and using of culture to embrace people's arts music, literature, philosophy, religion, commerce, political organisation, science and technology as well as all other ideas and values, implicit and explicit, that permeated a society and bind its people into a recognizable unite.

Education is an essential tool for development in every country of the world, and Nigeria is not an exception; a strong and effective education can help enhance the development of the country. Education has become one of the most powerful weapons known for reducing poverty and inequality in modern societies. It is also used for laying the foundation for a sustainable growth and development of any nation. Primary education in particular is the level of education that develops in the individual the capacity to read, write and calculate. In other words, it helps to eradicate illiteracy, which is one of the strongest predictors of poverty. Thus, Primary education is the only level of education that is available everywhere in both the developed and the developing countries as well as in urban and rural areas.

Assignment

- As a take home assignment, participants were asked to explain Education and Sustainable Development.

Closing Remarks:

- The researcher commended the participants for their cooperation.
- The participants were reminded to do their homework
- They were intimated with the time and venue for the next session.

Session 3

Topic – Administration of post-test instrument at the 8th week.

Objective: Administration of post-test instrument.

Activity: The post-test instruments were administered after which the researcher gave some counselling talk on how education contribute to sustainable development and encouraged the participants to seek any assistance concerning their learning from the researcher whenever they need such. A token gift was given to each person to show appreciation and thanked them for their co-operation.

Closing remark

- The researcher commended the participants for their time and effort.

APPENDIX 11
UNIVERSITY OF IBADAN
FACULTY OF EDUCATION
COUNSELLING AND HUMAN DEVELOPMENT STUDIES DEPARTMENT

Dear respondent,

This questionnaire was designed to elicit information on the effects of motivational enhancement therapy and self-monitoring skill training on Mathematics learning readiness and gains among school-going adolescents in Oyo State, Nigeria. You are implored to fill the questionnaires with sincerity and faithfulness. Your responses will be used for research purpose only and high level of confidentiality is guaranteed.

SECTION A (Personal Data)

INSTRUCTION: please fill the gap below as applicable to you.

1. Gender: Male (), Female ()
 2. Age: Below 15 Years (), 16 - 20 Years (), 21 and above ()

SECTION B (Learning Readiness Scale)

INSTRUCTION: Please tick (√) in the appropriate column

NOTE: SA means Strongly Agree (4), A means Agree (3), D means Disagree (2), and SD means Strongly Disagree (1)

S/N	ITEMS	SA	A	D	SD
1.	I love learning Mathematics always				
2.	Learning Mathematics is frustrating to me				
3.	The hours I spend doing Mathematics are the ones I enjoy most				
4.	I rarely expect to be able to apply Mathematics in life situations				
5.	I rarely expect to be successful in mathematical tasks given by Mathematics teachers in Mathematics classrooms				
6.	I practice solving mathematical problems on my own before the lesson commence				
7.	I rarely expect to perform well in Mathematics				
8.	I expect to be able to solve mathematical problems anywhere I come across them if they are of my level of education				
9.	I expect to get high scores in Mathematics tests				
10.	Learning Mathematics is in itself rewarding and motivating				
11.	I am satisfied with the way I learn Mathematics always				
12.	I do not feel uneasy during Mathematics lessons				
13.	I am dissatisfied with my participation in classroom mathematical activities				
14.	I am satisfied with the way Mathematics is taught in				

	Mathematics classrooms				
15.	I am satisfied with my performance in Mathematics assignments, tests and examinations				
16.	I aspire to study Mathematics in future				
17.	I am not sure whether there is need for me to continue studying Mathematics				
18.	I find activities in Mathematics lessons meaningful				
19.	Mathematics subject matter is related to my daily experiences				
20.	Mathematics is relevant to my needs and goals both in school and at home				
21.	I would like a career that does not require Mathematics				
22.	I am highly motivated to learn Mathematics				
23.	Learning Mathematics gives me opportunities for personal advancement				
24.	I expect to be able to apply Mathematics easily to other situations in life				

SECTION C (Mathematics Anxiety Scale)

S/N	ITEMS	SA	A	D	SD
1.	Mathematics makes me feel comfortable and easy.				
2.	Mathematics is most dreaded subject for me.				
3.	I feel worried before entering the Mathematics class.				
4.	I find Mathematics interesting.				
5.	Mathematics is one of my favorite subjects.				
6.	I am always afraid of Mathematics exams.				
7.	Solving Mathematics problems is always pleasant for me.				
8.	I feel nervous when I am about to do Mathematics homework				
9.	I feel happy and excited in a Mathematics class as compared to any other class.				
10.	I would prefer Mathematics as one of my subjects in higher studies				
11.	Mathematics is an headache for me.				
12.	I am afraid to ask questions in Mathematics class.				
13.	Mathematics doesn't scare me at all				
14.	My mind goes blank when teacher asks Mathematics questions				

Mathematics Learning Gains Test (MLGT)

- | | |
|---|------|
| 1. Simplify $(-8) \times (-3)$? (a) 24 (b) - 24 (c) 16 (d) -16 | (21) |
| 2. Solve for x in $x^2 - 5x = 6$ (a) 6 & - 1 (b) - 6 & 1 (c) 2 & -3 (d) -2 & 3 | (32) |
| 3. Find the value of x if $4x + 7 = 5x + 6$? (a) 1 (b) - 1 (c) 2 (d) -2 | (37) |
| 4. Find the value of $(-30) \div (-10)$? (a) 3 (b) - 3 (c) 30 (d) -30 | (59) |
| 5. 25% of N10 is equal to ____ (a) N2.50 (b) N25.0 (c) N250.0 (d) N2.00 | (29) |
| 6. 6 biros cost N90. Find the cost of ten Biros? (a) N150 (b) N15 (c) N200 (d) N250 | (56) |
| 7. If $4(y+7) + 12 = 0$, what is the value of y? (a) - 10 (b) 10 (c) 2 (d) -2 | (57) |

Previous S/N

8. Express 0.075 as a percentage? (a) 7.5% (b) 75% (c) 2.5% (d) 70% (1)
9. How many minutes are there between 10.45am and 2.05pm the same day? (a) 200 (b) 180 (c) 320 (d) 360 (49)
10. The product of three numbers is 24. If two of the numbers are 2 and 3, find the third number? (a) 4 (b) 5 (c) 6 (d) 7 (55)
11. The sum of certain number and 16 is 42. What is the number? (a) 26 (b) 27 (c) 28 (d) 30 (3)
12. Find the area of a circle of radius 21cm [Take $\pi = 22/7$] (a) 1386cm^2 (b) 1368cm^2 (c) 1836cm^2 (d) 1683cm^2 (53)
13. If 120 is 75% of a number p, what is p? (a) 160 (b) 170 (c) 180 (d) 200 (43)
14. The area of a square field is 121m^2 , find the perimeter of the fields? (a) 44m (b) 45cm (c) 46m (d) 48m (34)
15. Find the value of $-20 - (-100)$? (a) 80 (b) - 80 (c) -20 (d) 20 (51)
16. Find the radius of a circle whose circumference is 66cm? (a) 10.5cm (b) 17.5cm (c) 20.5cm (d) 21.0cm (60)
17. Simplify $-5 + (-4) - (-2)$ (a) - 7 (b) 7 (c) 11 (d) -11. (7)
18. What is the next term in the sequence 2, 3, 5, 8, 12, 17.... ? (a) 23 (b) 24 (c) 25 (d) 29 (12)
19. Evaluate $(a^2)^{-1/2}$ (a) $1/a$ (b) a^2 (c) $-a$ (d) a (9)
20. Express 0.0000728 in standard form (a) 7.28×10^{-5} (b) 7.28×10^{-3} (c) 7.28×10^3 (d) 7.28×10^5 (11)
21. Express 4.06×10^{-3} in ordinary form (a) 0.00406 (b) 0.0406 (c) 0.000406 (d) 0.406 (27)
22. Solve for c if $4^{c-1} = 64$ (a) $c = 4$ (b) $c = 5$ (c) $c = 6$ (d) $c = 7$ (2)
23. Express the decimal number 17 as a number in base two. (a) 10001_2 (b) 10110_2 (c) 10011_2 (d) 11111_2 (19)
24. If $x^2 = 81$ then x is _____ (a) 9 (b) 27 (c) 81 (d) 87 (4)
25. Given that $x = -1/2$ and $y = 4$, evaluate $3x^2y + xy^2$. (a) - 5 (b) - 1 (c) 5 (d) 1 (29)
26. Find the H.C.F of 48, 60 and 72 (a) 12 (b) 24 (c) 66 (d) 72 (18)
27. Given that $(2x + 7)$ is a factor of $2x^2 + 3x - 14$, find the other factor. (a) $x - 2$ (b) $x + 2$ (c) $2 - x$ (d) $x + 1$ (33)
28. The area of a circle is 38.5cm^2 . Find its diameter [Take $\pi = 22/7$] (a) 7cm (b) 14cm (c) 21cm (d) 6cm (44)
29. Express 0.0462 in standard form. (a) 0.462×10^{-2} (b) 0.462×10^{-1} (c) 4.62×10^{-5} (d) 4.62×10^{-3} (15)
30. Find 256 in index form. (a) 2^8 (b) 2^6 (c) 2^4 (d) 2^{12} (45)
31. Subtract $(-y + 3x + 5z)$ from $(4y - x - 2z)$ (a) $5y - 4x - 7z$ (b) $3y + 2x + 3z$ (c) $5y + 4x + 7z$ (d) $2x - 5y + 3x$ (26)

Theory

- Given that $\frac{x}{2} + \frac{x}{3} = 5$, find the value of x?.
- A man is four times as old as his son. The difference between their ages is 36 years. Find the sum of their ages
- The following are the scores of 10 students in Mathematics: 1, 2, 3, 3, 5, 6, 7, 8, 3 and 2.
Find:
 - Mean;
 - Median;
 - Mode and
 - Range

**UNIVERSITY OF IBADAN
FACULTY OF EDUCATION
COUNSELLING AND HUMAN DEVELOPMENT STUDIES DEPARTMENT**

Dear respondent,

This questionnaire was designed to elicit information on the effects of motivational enhancement therapy and self-monitoring skill training on Mathematics learning readiness and gains among school-going adolescents in Oyo State, Nigeria. You are implored to fill the questionnaires with sincerity and faithfulness. Your responses will be used for research purpose only and high level of confidentiality is guaranteed.

SECTION A (Personal Data)

INSTRUCTION: please fill the gap below as applicable to you.


1. Gender: Male (), Female ()
2. Age: Below 15 Years (), 16 - 20 Years (), 21 and above ()

SECTION B: (Attitude to Mathematics Scale)

1= Strongly Disagree, 2= Disagree, 3= Agree, 4= Strongly Agree

S/N	ITEMS	1	2	3	4
1.	I am a good Mathematics student				
2.	Sometimes I think Mathematics assignment is easy when other students think it is hard				
3.	I am a good science student				
4.	I am one of the best students in my class				
5.	I love to be solving mathematical problems				
6.	I usually understand Mathematics homework and assignments				
7.	I am certain I can figure out how to do the most difficult work in Mathematics class				
8.	I can do almost all Mathematics work in class if I don't give up				
9.	I could get the best grades in Mathematics if I tried hard enough				
10.	I like reading/solving Mathematics textbooks				
11.	It is not hard for me to get good grades in Mathematics				
12.	I am smart at solving mathematical problems				
13.	When Mathematics teacher asks a question I usually know the answer even if the other students do not				
14.	I will graduate excellently in this school as far as Mathematics is concern				
15.	Mathematics assist me to get good grade in science subjects				
16.	I do follow Mathematics lessons easily				
17.	I am able to help my classmates with their schoolwork in Mathematics				
18.	I work hard in school to excel in Mathematics				
19.	Most of my classmates work harder on their Mathematics home work than I do				
20.	I always get good grades in Mathematics whenever I try hard				

APPENDIX 111



THE WEST AFRICAN EXAMINATIONS COUNCIL

RESULT STATISTICS FOR WASSCE 2014 SUMMARY

S/N	Statename	TOTAL NO OF CANDS			5 Credits & above including English & maths			
		Male	Female	TotalSat	Male	Female	Total	Percentage
1	ANAMBRA	23,009	28,709	51,718	14,985	19,109	34,094	65.92
2	ABIA	26,589	29,610	56,299	15,347	17,600	32,947	58.52
3	EDO	33,079	31,330	64,409	18,476	18,763	37,242	57.82
4	BAYELSA	10,585	9,345	19,930	5,562	4,967	10,529	52.83
5	RIVERS	31,887	32,461	64,358	16,566	17,402	33,968	52.78
6	ENUGU	20,425	25,686	46,111	10,787	13,148	23,935	51.91
7	LAGOS	71,700	74,654	146,354	32,334	34,685	67,219	45.86
8	IMO	21,500	24,459	46,359	8,514	10,325	18,839	40.64
9	DELTA	25,449	25,311	50,760	10,064	10,301	20,365	40.12
10	KADUNA	58,149	42,213	100,362	20,464	18,030	38,514	38.38
11	EBONYI	12,781	12,677	25,438	4,052	4,518	9,170	36.05
12	EKITI	11,373	10,905	22,278	3,570	3,960	7,530	33.80
13	ONDO	20,323	18,474	38,797	5,439	6,133	12,572	32.40
14	AKWA-IBOM	29,143	29,997	59,140	8,729	9,743	18,472	31.23
15	ABUJA	8,433	9,720	18,153	2,612	2,958	5,568	30.67
16	KWARA	18,302	15,543	33,845	5,058	4,941	9,999	29.54
17	KANO	42,089	23,990	66,079	10,892	7,611	18,503	28.00
18	OGUN	35,156	35,318	70,474	9,313	9,661	18,974	26.92
19	BENUE	29,339	21,794	51,133	7,884	5,851	13,735	26.86
20	KOGI	24,230	18,785	43,015	5,978	4,746	10,724	24.93
21	CROSS-RIVER	24,781	21,805	46,586	5,561	4,918	10,479	22.49
22	OSUN	24,421	23,251	47,672	4,865	4,651	9,316	19.54
23	PLATEAU	28,605	23,647	52,452	5,850	4,359	10,209	19.46
24	OYO	39,340	38,332	77,672	7,491	7,263	14,754	19.00
25	NASSARAWA	27,991	19,307	47,298	4,891	3,730	8,621	18.23
26	NIGER	31,025	20,790	51,815	4,982	4,229	9,211	17.78
27	TARABA	15,481	9,107	24,588	2,329	1,433	3,762	15.30
28	BORNO	19,350	12,633	31,983	2,845	2,021	4,866	15.21
29	KATSINA	30,268	13,245	43,543	2,868	1,681	4,549	10.45
30	ADAMAWA	17,700	12,635	30,235	1,510	1,136	2,646	8.75
31	JIGAWA	13,548	4,247	17,793	944	386	1,330	7.47
32	SOKOTO	18,321	7,070	25,391	1,193	616	1,809	7.12
33	ZAMFARA	21,676	7,391	29,066	1,337	617	1,954	6.65
34	KEBBI	19,074	7,541	26,615	1,366	320	1,676	6.30
35	GOMBE	12,356	7,146	19,502	593	514	1,107	5.68
36	BAUCHI	19,501	9,831	29,332	896	652	1,548	5.28
37	YOBE	11,040	4,291	15,310	487	256	743	4.85
	Total	929,045	763,330	1,692,375	268,047	261,432	529,479	31.29

***Oyo State Basic Education Certificate Examination (BECE):
Mathematics Results 2008 – 2015***

Years	Total Students	% Students with Credit and Above	% Students Below Credit
2008	89,826	38.1%	61.9%
2009	112,182	31.2%	68.8%
2010	123,894	36.5%	63.5%
2011	132,560	33.7%	66.3%
2012	96,050	35.1%	64.9%
2013	133,784	39.3%	60.7%
2014	102,643	41.1%	58.9%
2015	113,819	37.4%	62.6%

Source: Oyo State Ministry of Education (2015)

APPENDIX 1V

Consent Form for Students

I **(Name)**.....from **(School)**..... hereby
agreed to participate in the research trainingme organized in my school and also promise to
abide by the rules and regulation attached.

Name of the Students & Signature with Date

.....

Consent Form for Parents

I **(Name)**.....the Parents/Guardians of above students from
(School).....hereby agreed on my Child participation in the
research trainingme organized in the school and also promise you of my mutual co-operation.

Name of the Parents & Signature with Date

.....