

Effect of Mastery Learning Strategy on Mathematics Achievement of Senior Secondary School Students in Ngor-Okpala Local Government Area of Imo State, Nigeria

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ABSTRACT

The study was carried out to determine the effects of Mastery Learning Strategy on Mathematics Achievement of Senior Secondary Students. The study was carried out in Ngor-Okpala Local Government Area of Imo State. The quasi-experimental design was used for the study adopting the pre-test, post-test control type. The population consist of all senior secondary two students in the local Government area while the sample consists of one hundred and twenty three Senior Secondary two (SS2) students. A 30 item objective test drawn from the topic simultaneous equation titled Mathematics Achievement Test (MAT) was used to collect data. The construction was guided through table of specification. It had reliability coefficient of 0.80 determined through Kuder-Richardson formula 20(KR-20). The result of the study revealed that students in the Mastery learning class had better achievement than those in traditional method class. Also female students had equal achievements with their male counterparts. Base on the result of the study, it was recommended that Mastery learning strategy should be applied in teaching mathematics in secondary schools.

Keywords: *Mastery Learning Strategy, Mathematics Achievement*

INTRODUCTION

The development of any nation totally depends on the nations scientific and technological height as no nation develops beyond its scientific awareness. If a nation is to be scientifically, technologically, politically and otherwise stable, it must produce logical minds. It must foster mathematical thought and must recognise that its place in the world cannot stand long without the commitment to and the continued pursuit of mathematics and logical thoughts. Mathematics is about ideas; in particular, it is about the way that different ideas relate to each other. It deals with understanding problem situations and proffering solutions to solving the problems through logical thinking. Any nation where mathematical reasoning and consistency apply can truly claim to have effectively entered the realm of scientific and technological development. Shapiro (2000)

defines mathematics as the study of qualitative relations; put simply, it is the science of structure, order nuclei space and relationships about counting, measuring and describing of shapes and objects. Soyemi (1999) in Umameh (2011) notes that mathematics is a body of knowledge that opens up the mind to logical reasoning, analytical thinking and the ability for creative thinking, deep focusing and clarity of thought and precision. It is the hub on which all scientific and technological studies find their bearings. According to Kurumeh, Omenka and Mohammed (2013), the scientific and technological development of a nation depends largely on the mathematical understanding of its citizens. Abakpa and Iji (2011) submit that mathematics is an intellectually stimulating subject that affects every facet of human activity such as politics, economy, science and technology.

Despite the importance accorded mathematics in Nigeria's quest for scientific and technological development, some students still dislike, hate and fear mathematics, leading to mass failure and consistent abysmal performance in ordinary level (O/Level) mathematics examination over a decade now (Maduabum and Odili, 2006). According to Uwadiae (2010), despite the relevance of mathematics in national development, analysis of school certificate mathematics examination result show that students have consistently low performance as less than 42% of registered candidates obtain credit pass. This is an indication that the students' outcome in the subject area is not impressive for a developing nation like Nigeria. According to Mills (1991), teaching methods therefore are a crucial factor that affects the academic achievement of students. Uloko and Usman (2008) reported that there is positive correlation between good teaching approach and students' achievement in mathematics. Iji (2005) opined that, good teaching approach will lead to high achievement among learners while poor teaching approach will lead to poor learning and low achievement. In an attempt to achieve a better performance in mathematics, various strategies of teaching have been tried outside the traditional method of teaching, one of which is the Mastery Learning Strategy (MLS).

Mastery Learning Strategy is an instructional method, where students are allowed unlimited opportunities to demonstrate mastery of content taught. Mastery Learning Strategy involves breaking down the learning, each with its own objectives. The strategy allows students to study materials unit after unit until they master it (Dembo, 1994). Mastery Learning Strategy (MLS) helps the students to acquire pre-requisite skills to move to the next unit. This strategy divides subject matter into units that have pre-determined objectives or unit expectations. Students alone or in groups work through each unit in an organized fashion. Students who do not achieve mastery receive remediation through tutoring, peer monitoring, small group discussions or additional homework. According to Wambugu and Changeiywo (2008), Mastery Learning Strategy (MLA) has the unique quality of enabling mastery of content by the student through supplementary instruction and corrective activities of small units of the subject matter. MLA also requires the teacher to do task analysis, thereby becoming better prepared to teach the units. Goliath (2007) noted that, proponents of mastery learning

affirmed that under appropriate instructional conditions, learners will learn and benefit maximally from the instruction. Thus, mastery learning is based on the assumption that if instruction is good, qualitative and appropriate learners will learn well and achieve high when learning time is varied according to learner's pace. Guskey and Gates (1986) in their meta-analysis observed that, students in mastery learning programs at all level showed increased gains in achievement than those in traditional instruction program. Students retained what they had learned longer under mastery learning, both in short-term and long-term studies. Students were engaged in learning for a larger portion of the time they spent in mastery classes and required decreasing amount of corrective time over a series of instructional units. Students developed more positive attitudes about learning and about their ability to learn. Teachers who used mastery learning developed more positive attitudes towards teaching higher expectations for students, and greater personal responsibility for learning outcomes.

Wambugu and Changejwo (2008) in their research found out that the students who were taught through mastery learning teaching method achieved statistically significantly higher scores compared to those who were taught through the traditional method. Mevarech (1985) showed that mastery learning was the indicator that significantly increased achievement. Abakpa and Iji (2011) showed that students taught geometry using mastery learning improved in their achievement than those in traditional approach. Oloyede (2010) in his study concluded that mastery learning strategy can facilitate both cognitive and affective outcomes. The strategies applied in the teaching and learning of mathematics in our secondary schools today has been a source of worry to stake holders. This is due to the fact that the strategy has not done anything good in achievement of secondary schools students. The traditional teaching approach as applied in our secondary school today is a teacher-centred approach which does not allow the students to participate in the teaching-learning process. This has undoubtedly resulted to consistent poor achievement among the students. The present study therefore was undertaken to investigate the effects of mastery learning strategy on mathematics achievement of senior secondary students. The main purpose of this study is to compare mastery learning strategy with traditional method of teaching mathematics. Specifically, the study will determine whether:

- i Students taught mathematics using mastery learning strategy will have better achievement than those taught using traditional approach.
- ii A difference will exist between the achievement of male and female students taught mathematics using mastery learning strategy.

The following hypotheses guided the study;

- H₀1:** There is no significant difference between the mean achievement scores of students taught mathematics using Mastery Learning Strategy (MLS) and traditional method.
- H₀2:** There is no significant difference between the post-test mean achievement scores of male and female students taught mathematics using mastery learning strategy.

METHOD

The study employed a quasi-experimental design adopting non-equivalent pre-test post-test control group type. The population consists of all senior secondary two (SS2) students in Ngor-Okpala Local government area of Imo State. Four schools were purposively selected for the study since it was not possible to re-organized and interfere with the school programme. A total of 123 students made up of 67 females and 56 males. In each of the schools selected two intact classes were randomly signed experiment and control groups. The experiment group had total of 62 students (35 females and 27 males) while the control group had total of 61 students (32 females and 29 males). A thirty items objective test instrument was used for data collection. It was entitled “Mathematics Achievement Test (MAT)”. It was drawn using table of specification based on the topic (simultaneous equation) taught the students. The face and content validity was determined by three mathematics education experts and two measurement and evaluation experts. Their inputs guided the adjustment of the instrument. The instrument had reliability coefficient of 0.80 determined using Kuder-Richardson formula²⁰(KR-20), this was regarded suitable for the study. In administering the instrument, a pre-test was administered to both control and experiment groups to ensure they were of the same cognitive background. After that, four mathematics teachers trained on the application of mastery learning strategy, taught the experimental groups in each of the selected schools, using the strategy as outlined in the lesson plan. The control groups were taught the same topic by their regular classroom mathematics teacher using the same lesson plan but traditionally constructed. The programme lasted for four (4 weeks) after which a post test was administered to both groups. The data collected was subjected to analysis using analysis of covariance (ANCOVA) and t-test statistical tools.

RESULTS AND DISCUSSION

Table 1 shows that the computed f (25.156) is greater than f -critical (3.84) also sig (.000) is less than sig (0.05). This implies that a significant difference exists between the mean achievement scores of students taught mathematics using mastery learning strategy and traditional method. The null hypothesis that there is no significant difference between the mean achievement scores of students taught mathematics using mastery learning strategy and traditional method is rejected at 0.05 level of significance. Table 2 shows that the calculated t -value (.200) is less than t -critical (1.645) also sig (.312) is greater than (0.05). Therefore, the result implies that no significant difference exists between the post-test mean achievement of male and female students taught mathematics using mastery learning strategy (MLS). The null hypothesis that there is no significant difference between the post-test mean achievement scores of male and female students taught mathematics using mastery learning strategy is upheld at 0.05 level of significance. The result of the study revealed that mastery learning strategy is better than the traditional

method. This was evident in the result which showed that statistical difference exists between the mean achievement of students taught mathematics using mastery learning strategy (MLS) and the traditional method. The difference in mean was in favour of those in the mastery learning group. This result is in agreement with the earlier reviewed work of Abakpa and Iji (2011). Also the study revealed that female students in the mastery learning group achieved as much as their male counterpart as no statistical significant difference existed in their post-test mean achievement. This result is in line with the findings of Wambugu and Changeigwo (2007), Abakpa and Iji (2011) which showed that mastery learning strategy (MLS) is beneficial to both boys and girls.

Table 1: Summary of ANCOVA analysis on student's achievement

Source	Sum of squares	df	Mean of square	F	sig	decision
Corrected model	2630.508	2	1315.254	12.581	.000	s
Intercept	16315.003	1	16315.003	156.056	.000	
Pretest	31.171	1	31.171	.298	.586	
Method	2629.994	1	2629.994	25.156	.000	
Error	12545.508	120	104.546			
Total	257902.000	123				
Corrected total	15176.016	122				

a. R squared = .173 (adjusted R. squared = 160).

Table 2: Summary of t-test analysis of male and female achievements

Group	N	Mean	SD	df	t-cal	T0.05	Sig	Dcsn
Males	27	48.82	8.28					
				60	.200	1.645	.312	N/sig
Females	35	48.34	9.85					

CONCLUSION AND RECOMMENDATIONS

The study was carried out to determine the effects of mastery learning strategy on mathematics achievement of senior secondary students. The result of the study revealed that mastery learning strategy improved student's achievement in mathematics and enabled female students have improved achievement with their male counterparts. The result of the study implies that, when mastery learning strategy (MLS) is applied in teaching and learning of mathematics, students achievement in the subject area will improve which will snowball into having students who will be ready to get involved courses which are scientific and technologically based. This in-turn improves the nation's quest for scientific and technological development. Based on the result of the study, the following recommendations are made:

1. The mastery learning strategy should be adopted in teaching mathematics in secondary schools to improve students' achievement.
2. Curriculum planners should incorporate mastery learning strategy which would enhance the learning of mathematics.

3. Seminars, workshops and symposium should be organized by secondary school managers to train teachers in the use of mastery learning strategy in teaching mathematics.

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