

STUDENTS ATTITUDE TO MASTERY LEARNING INSTRUCTIONAL APPROACH IN TEACHING MATHEMATICS ON THEIR ACHIEVEMENT IN MATHEMATICS IN OYO STATE, NIGERIA.

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Keywords:
*Mastery; Learning;
Instructional;
approach; Students';
Mathematics; Nigeria;*

ABSTRACT

This paper presents students' attitude to mastery learning instructional approach implementation in improving their achievement in mathematics among senior secondary school students' in Ibadan Metropolis. Mastery learning is an alternative method of teaching and learning that involves the student reaching a level of predetermined mastery on units of instruction before being allowed to progress to the next unit. The study adopted the action research type of the non experimental design. The study population consisted of senior secondary school students in private schools in the state. The multistage sampling technique was used to select the samples of the study which comprised of all SS 1 student's in a private secondary school in the city (37 students). Results of the study show that mastery learning strategy is effective in enhancing students' learning outcomes in mathematics; students have a positive attitude towards the implementation of mastery learning strategy in teaching and learning mathematics; the gender of students do impact on their achievement in the subject. It is recommended therefore, that mathematics teachers should be encouraged to adopt mastery learning approach during instructions and that educational planners

increase the numbers of periods allotted to mathematics teaching and learning in schools as this would foster students' learning outcomes/mastery of the subject.

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INTRODUCTION

Mathematics is a basic instrument in the development of any science based knowledge for sound analytical reasoning in daily living in a modern society such as ours (Babalola, 1983). The Nigerian Government is quite desirous of achieving scientific and technological innovations geared at encouraging students' learning of science related subjects viz-a-viz their applications in solving problems as they emerge over time. Mathematics as a subject has been described as a model of thinking which encourages learners to observe, reflect and reason logically about a problem; communicating ideas, making it the pivot of intellectual discipline, a vital tool in science, commerce and technology and as a precursor of scientific discoveries and inventions (Iji, 2008; Imoko & Agwagah, 2006; Salman, 2005).

Despite the accorded essence and recognition to mathematics, Elekwa (2010) posited that students exhibit non-chalant attitude towards the subject, even when they are aware of its' usefulness in their future academic and career undertakings. Students who might have conditioned their minds that the subject is difficult are usually of poor attitude and underperforming in internal or external examinations. An analysis of school certificate mathematics examination results shows that students' achievements in mathematics are consistently poor. Uwadiae, (2010) reported that less than 42% of registered candidate in SSCE obtain credit pass in mathematics. Even the SSCE results released by WAEC and NECO for 2012 indicated poor achievement of students in mathematics. Also, Olunloye (2010) restated the ugly trend of high failure rate in mathematics as a national disaster. Therefore, feasible ways of improving the performance has remained an area of great concern for researchers. The deplorable state of mathematics achievement is attributed to a number of factors such as attitude of students (Uhumuavbi & Umoren, 2005); lack of instructional resources (Yara and Otieno, 2010); Instructional techniques (Olulonye, 2010) among others. Overmayer (2010) stated that the challenge of covering the entire mathematics syllabus while accommodating the needs of struggling students creates an almost impossible situation. Consequently, many students move through the mathematical curriculum with deficiencies. Students stumble through the mathematics curriculum with these gaps in learning, gaps that seem to grow exponentially, until finally, frustrated by continuous failure, many drop out.

Mathematics teachers know what to teach, when and how to teach and understand why students are having difficulty in passing Mathematics examination as well as how to stimulate interest in the subject. Adeleke (2007) conducted a study on topics preference of senior secondary students in Mathematics, she discovered that numbers and numerations, algebraic process and statistics were the most preferred topics while bearing and distances, probability and menstruation were the most disliked topics. Nnaji (1998) in another study found out that some topics which students perceived as difficult; namely: longitude and latitude, bearings and distances, probability, two-variables inequality, change of subject formula, arithmetic and geometry (sequence and series), number bases, graphs (linear and quadratic types) and set theory are the major difficult topics for the students. According to Akinsola (1987) some of the most common reasons for disliking Mathematics include rigidity and lack of creativity, anxiety of the students and poor teaching methods.

Current students 'learning outcomes reveals that the conventional teaching approach may be deficient in meeting the needs of majority of learners. The present practice of mechanically applying the same methods to dull, average as well as the bright children could be responsible for much of the ineffectiveness of instruction given in schools. In the classroom, instructions are prepared with the average students in focus. The above average of fast learners feels bored whereas slow learners or below average students remain passive leading to poor attitude and achievement in mathematics. Instructional technique adopted by the teacher can be manipulated to bring about improvement in performance of students. Hence teaching and learning of mathematics consistently generates interest among scholars over the years. Several studies have shown that good instructional strategies are capable of improving the achievement of students in mathematics and other subjects (Iji, 2005; Ihendinihu, 2008). What is imperative therefore is an innovative proposal for change, a major departure from current practices. An alternative to overcoming these challenges is mastery learning.

Mastery learning according to Block and Anderson, 1975; is an approach to learning intended to bring all students to a pre-established level of mastery on a set of instructional objectives. Students are taught the defined objectives, formatively assessed, given corrective instruction if needed, and then summatively assessed. This model provides teachers with timely feedback about the progress and deficiencies of students in meeting specific instructional goals and presents a curriculum that provides extra time and opportunities for all students irrespective of their cognitive capacity to attain mastery. This learning approach takes care of individual differences in learning, assimilation, analysis of concepts taught and its synthesis when assessed. Mastery learning as an instructional strategy is based on the principle that all students should learn a set of reasonable objectives with appropriate instruction and sufficient time with little or no pressure. With this instructional strategy, students are not advanced to a subsequent learning objective until they demonstrate

proficiency with the current one taught as they must demonstrate mastery on unit examinations, typically 80%, before moving onto new material (Davis & Sorrell, 1995). Students who do not achieve mastery (who must have underperformed) receive remediation through tutoring, peer monitoring, small group discussions, or additional homework. Additional time for learning is prescribed for those requiring remediation.

Students' attitudes towards mastery learning approach do vary, especially across gender. Students' attitude to mastery learning approach refers to students' general disposition towards the conduct and implementation of mastery learning as a strategy for mathematics teaching and learning. Attitude is a kind of learning which is acquisitive and is affected by the external factors. It is changeable and if this change occurs due to recognition of anything in person, it will have effect on his emotions and his readiness for acting and behaving toward it. It seems that application of mastery learning method has effect on recognition and image of the person about his success and as a result, it has effect on his emotions to mathematics and has created readiness in the person for learning mathematics; if not other subjects. When students' possesses the right attitude, their interest, attitude and performance in the subject specifically enhances; however, this could be as a result of the students' gender.

Gender is a variable that could predict students' achievement in learning. It involves the psychological and socio-cultural dimensions of being male or female. Most studies have shown that on the average girls do better in schools than boys more especially in language-learning situations such as reading and writing. It seems that boys are more interested in subjects associated with numbers and are trained to tackle difficult problems than their female counterparts. Boys generally are seen to be stronger physically than the girls and so can as well handle difficult jobs, but recent development has changed such notion since girls are also delving into some activities which were previously believed to be for boys, in the field of engineering and mechanical works. Unfortunately, gender inequality in education has remained a perennial problem of global scope (UNESCO, 2003; 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 achieve highly as their male counterparts in science based knowledge (Howes, 2002; Sinnes, 2006).

Academic achievement of student is students' ability to study and recall facts; being able to communicate their knowledge orally or in written form even in an examination condition. It is the extent to which they apply what they have been taught or learnt in a school/classroom setting at any point in time; most especially when they are formatively or summatively assessed, in which case, they could be low, moderate or high academic achievers. Academic achievement is therefore a yard stick for ascertaining the capabilities of a pupil from which his overt, covert and inherent or unrevealed abilities could be inferred. Factors that influence a

students' academic achievement at any level of education are not conclusively known and could be multivariate in nature.

STATEMENT OF THE PROBLEM

The teaching and learning of some perceived difficult topics in the secondary school mathematics curriculum remains an issue to be addressed; as this may have been causing students poor achievement in the subject. The study investigated the essence of mastery learning instructional approaches as well as students' attitude to its implementation in teaching mathematics can influence their achievement in the subject.

RESEARCH QUESTIONS

1. At what mastery learning stage did the student perform better?
2. What is students' attitude to mastery learning approach in teaching and learning mathematics?
3. Is there a relationship in students' achievement in mathematics across gender as a result of mastery learning instructional approach?
4. Is there a relationship between students' attitude towards mastery learning instructional approach and their achievement in the mathematics?

RESEARCH METHODOLOGY

(i) Research Design

The study adopted the action research type of the non experimental design. This design accommodates generalization of the findings of the study upon the whole population from which only a representative portion will be studied.

(ii) Population, Sampling Technique and Sample

The study population comprised of all senior secondary school 1 (SS I) students in private secondary schools in Ibadan Metropolis, Oyo state. The study adopted the multistage sampling technique. Simple random sampling was used in selecting an educational zone in Oyo state; the Ibadan metropolis. A local government area from the zone (Akinyele L.G.A) was purposely selected from the educational zone. Simple random sampling was also used to select a private secondary school in the LGA. Also, purposive sampling was used to select an SS 1 intact class in the school; comprising of 37 students.

(iii) Instrumentation

Two instruments were developed and used for data collection for the study. They are: mathematics achievement test (MAT) and students' attitude to mastery learning questionnaire (SAMLQ). The mathematics achievement test (MAT) with Kudar-Richardson KR-20 reliability

coefficient of 0.81, students' attitude to mastery learning questionnaire (SAMLQ) with Cronbach Alpha reliability coefficient index of 0.74. The instruments were all developed, pilot tested and validated by the researchers. The Mathematics Achievement Test (MAT) contains questions designed to test the cognitive level of achievement of the learners' in Mathematics. It consists of 6 theory test items. Correct response to each of the items attracted a score of 5 while an incorrect response attracted a score of 0. The mathematics achievement test (MAT) was administered to a sample of about 38 students in the intact class. The students' attitude to mastery learning questionnaire (SAMLQ) consisted of section A and B. The section A captured students' demographic data while the section B had 9 items designed to elicit students overall attitude towards the use of mastery learning instructional approach in teaching mathematics.

(iv) Procedure for Data Collection

The researchers administered the instruments to the students while the intact class mathematics teacher was adopted to teach a particular topic in the sampled schools. The test was administered to the students after the thorough teaching of a particular topic from the SS 1 mathematics textbook (inequalities). The administered tests were retrieved from the students after each testing by the researcher and recorded all the way. The study lasted for 4 weeks. The regular mathematics teacher of the class selected for the study was coordinated and trained as research assistants to help in conducting the study. The teacher took up the group (SS 1) intact class. Students in the class received mastery learning instructions on a particular topic (in this case: inequalities) for all the periods of mathematics in that four weeks. The students were all taught the said topic throughout all the mathematics period in the weeks and at the end of each week, a test that is the same in nature (which is to be administered to them throughout the study period) was given to the students by the teacher to determine the extent to which all of them have understood the said topic. The researcher scored all the scripts of the students for this first cycle and recorded their scores. The same topic was taught in the second week, students were tested and their scores recorded as for the second cycle. The same was done for the third and last cycles in the third to fourth week.

(v) Data Analysis

The data collected were analysed using descriptive and inferential statistics (frequency counts and percentages, mean and standard deviation and correlation) at 0.5% level of significance. The Data obtained from the test scores of the 37 students were analysed to answer the research questions raised in the study. The research questions raised were answered using descriptive and inferential statistics.

RESULTS

Research question 1: At what mastery learning stage did the student perform better?

Total Number of Student in Class	Descriptive statistics	Stage One Test	Stage Two Test
37	Mean	15.21	20.39
	Std. Deviation	3.878	4.475

From Table 1, it is evident that students' performance was better and higher in the second test than in the first test; as the performance of students in the second test had a mean value of 20.39 and std. deviation of 4.475 which is higher than that of the first test performance of students with mean value of 15.21 and std. deviation of 3.878.

Research question 2: What is the correlation between students' attitude to mastery learning instructional approach and their achievement in both tests?

Table 2: Correlation between student attitude and test achievement

Variables	Stage One Test	Stage Two Test	Students Attitude to Mastery Learning
Stage One Test			
Pearson Correlation	1	.250	-.271
Sig. (2 tailed)		.129	.100
Stage Two Test			
Pearson Correlation	.25	1	-.153
Sig. (-2 Tailed)	.129		.360
Students Attitude to Mastery Learning			
Pearson Correlation	-.271	-.153	1
Sig. (2 -Tailed)	.100	.360	

*Significant at $p < 0.05$

Table 2 represents the Pearson product moment correlation result of the relationships between students' performance in the stage one test, stage two test and students attitude to mastery learning. The table reveals a low positive significant relationship between the variables; students' performance in the stage one test and the stage two test. Also, there is a negative correlation between students first and second test achievement and their attitude to mastery learning instructional approach. This entails students' achievement in mathematics is not dependent on their attitude to mastery learning instructional approach.

Research question 3: What is students' attitude to mastery learning approach in learning mathematics?

Table 3: Attitude of students to mastery learning instructional approach

S/ No	Statements on Students' attitude to Mastery Learning	SA	A	D	SD	Mean	St. Dev	REMARK
1.	I enjoy mastery learning class all the time	23 (62.2)	14 (37.8)	0 (0)	0 (0)	3.38	.492	Positive
2.	I sleep each time mastery learning is use to teach mathematics in my class	0 (0)	0 (0)	31 (83.8)	6 (16.2)	1.84	.374	Positive
3.	Mastery learning has made me understand mathematics better	5 (13.5)	32 (86.5)	0 (0)	0 (0)	3.14	.347	Positive
4.	Mastery learning in teaching mathematics is the reason i hate mathematics	0 (0)	0 (0)	26 (70.3)	11 (29.7)	1.70	.463	Positive
5.	Teaching mathematics with mastery learning makes mathematics easy and interesting to me	12 (32.4)	25 (67.6)	0 (0)	0 (0)	3.32	.475	Positive
6.	My teacher should stop using mastery learning in mathematics classes	0 (0)	0 (0)	13 (35.1)	24 (64.9)	1.65	.484	Positive
7.	Mastery learning should be used for teaching other subjects except mathematics	0 (0)	0 (0)	18 (48.6)	19 (51.4)	1.51	.507	Positive
8.	I am very attentive during Mastery learning classes	3 (8.1)	34 (91.9)	0 (0)	0 (0)	3.08	.277	Positive
9.	I now love mathematics more due to my teacher using mastery learning technique to teach us	10 (27)	27 (73.0)	0 (0)	0 (0)	3.27	.450	Positive

Grand Mean = 22.89

weighted Average = 2.54

Table 3 exposes the attitude of students to mastery learning approach in the teaching and learning of mathematics. From the table, of the 37 students under study, all the 37 students agreed that: they enjoy mastery learning class all the time; mastery learning has made me understand mathematics better; mastery learning in teaching mathematics is the reason i hate mathematics; teaching mathematics with mastery learning makes mathematics easy and interesting to me; they are very attentive during Mastery learning classes; they now love mathematics more due to my teacher using mastery learning technique to teach us and that their teacher should always employ mastery learning in teaching us every topic in the mathematics textbook. More so, all the 37 students' disagreed to the statement that: they sleep each time mastery learning is use to teach mathematics in my class; their teacher should stop using mastery learning in mathematics classes and that mastery learning should be used for teaching other subjects except mathematics. From the aforementioned, it can be concluded that students' possesses a positive attitude to their teachers employing mastery learning in teaching them mathematics.

Research question 4: Is there a relationship in students' achievement in mathematics across gender as a result of mastery learning instructional approach?

Table 4: Correlation between student achievement across gender

Variables	Test 1	Test 2	Gender
Test 1			
Pearson Correlation	1	.250	.200
Sig. (2 tailed)		.129	.228
Test 2			
Pearson Correlation	.250	1	.438**
Sig. (-2 Tailed)	.129		.006
Gender			
Pearson Correlation	.200	.438**	1
Sig. (2 -Tailed)	.228	.006	

*Significant at $p < 0.05$

Table 4 reveals that gender have a low positive relationship with students' achievement in both the first and second tests; as it was significant at 0.01 level of significance. Thus, achievement of students in mathematics is gender related.

DISCUSSION

Results of the study show that mastery learning strategy is impactful in enhancing students' achievement in mathematics. The findings from the study corroborates those of other researchers (Samuel, 2007; Wambugu and Changeiywo, 2008; Olunfunmilayo, 2010; Akinsola, 2011; and Abakpa and Iji, 2012) who reported that mastery learning if effectively employed would

enhance students' academic achievement in various school subjects. Also, the findings of the study support the findings of Iji (2005) and Elekwa (2010) who reported that effective instructional mastery strategy equally improved the performance of both high and low ability students. Thus, mastery learning approaches enhances the achievement of students of different abilities in a learning task. It was also observed that students' possesses a positive attitude to the mastery learning instructional approach when used in teaching mathematics. Moreover, the findings of the study is in consonance with the findings of Campbell et al. 2000; Epstein, 1991; Fluty, 1997; which confirms that students gender plays a significant role towards their academic achievement. However, the study findings negates those of Abiam and Odok (2006); Olatoye and Ogunkola (2008); who found no significant relationship between gender and achievement in mathematics.

Conclusion and Recommendation

Research evidence shows that mastery instructional approach does positively influence academic achievement of students. Current results show that the conventional teaching approach may not be adequate in meeting the needs of learners in mathematics, hence the need to refocus attention on other alternative teaching approaches such as the mastery learning approach. Mastery learning approach is found to be effective in enhancing the achievement of students in mathematics. Students do have a positive attitude to mastery learning instructional approach been used in teaching them mathematics and there is a positive relationship with students gender and mathematics achievements. It is hereby recommended that mathematics teachers be encouraged to adopt mastery learning instructional approach during instructions to foster students learning and retention of mathematics concepts and educational planners should incorporate more periods for the teaching and learning of mathematics to ensure additional instructions and mastery of the content taught since the mastery learning teaching approach requires longer time/periods if mastery of the content taught is to be achieved.

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