

Effects of Mastery Learning Approach on Students' Achievement in Physics

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Abstract

This study investigated the effect of Mastery Learning Approach (MLA) on students' achievement in Physics. Using stratified random sampling, a total of 160 Senior Secondary school II Physics students from four selected Senior Secondary Schools in Bariga and Somolu Local Government Areas of Lagos State was used for the study. Two research questions and hypotheses were formulated and tested respectively. The study was a non-randomized pre-test post-test control group design. Students in the experimental groups were exposed to MLA teaching method while those in the control groups were exposed to the Conventional Teaching Method (CTM). The instruments used in the study were Physics Achievement Test (PAT) to measure students' achievement and a questionnaire on 4-point scale was used to measure their attitudes towards Physics. The instrument were pilot tested; r value for PAT=0.7 using split half method and $r=0.83$ for questionnaire using Cronbach Alpha. T-test, Pearson Correlation and Analysis of Variance (ANOVA) were used in analyzing the data. The result showed that students exposed to MLA performed better than those taught using CTM. Also students with positive attitudes towards Physics performed better than those with negative attitudes towards Physics. Consequently, it is recommended that MLA should be encouraged in schools for improved students' achievement and positive attitude towards physics.

Key words: Mastery learning, physics achievement.

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Introduction

Science has been regarded as the bedrock which modern day technological breakthrough is built. Nowadays, countries all over the world, especially the developing ones like Nigeria, are striving hard to develop technologically and scientifically, since the world is turning scientific and all proper functioning of lives depend greatly on Science, Oladejo, Olosunde, Ojebisi, Isola, and Olawale(2011). According to Ogunleye (2002) Science comprises the basic disciplines such a Physics, Chemistry, Mathematics and Biology. Many investigations have shown that secondary school students are exhibiting dwindling interest in Science (Esiobu, 2005). Besides, Physics as one of the Science subjects remains one of the most difficult subjects in the school curriculum according to the Nigeria Educational Research and Development Council (NERDC) (Isola, 2010). Studies have revealed that the performance of Nigerian students in Ordinary Level Physics was generally and consistently poor over the years Omosewo (1999).

Poor academic achievement in Physics could be attributed to many factors among which teacher's strategy itself was considered as an important factor. This implies that the mastery of Physics concepts might not be fully achieved without the use of instructional materials. The teaching of Physics without instructional materials may certainly result in poor academic achievement. Franzer , Okebukola and Jegede (1992) stressed that a professionally qualified science teacher no matter how well trained, would unable to put his ideas into practice if the school setting lacks the equipment and materials necessary for him or her to translate his competence into reality. Oladejo, Olosunde, Ojebisi, Isola, and Olawale (2011) Kibler, Cegala, Watson, Barker & Miler, (1981) in Wambugu and Changeiywo (2007) reported that Mastery Learning Approach (MLA) is an instructional method, where students are allowed unlimited opportunities to demonstrate mastery of content taught. Mastery Learning Approach (MLA) involves breaking down the subject matter to be learned into units of learning, each with its own objectives. The strategy allows students to study material unit after unit until they master it; Dembo (1994). Bloom (1984) in his research on group instruction, showed scores of students taught through Mastery Learning Approach were around the ninety-eighth percentile, or approximately two standard deviations above the mean. He argued that students taught through Mastery Learning needed more time to master more advanced material. The

Mastery Learning Approach used in the study stressed more of mastery of content, through corrective feedback and remediation rather cooperative skills but the results showed that Mastery Learning Approach is superior to conventional teaching method in terms of achieving higher scores. Also, Wachanga and Gamba (2004), in their study on effects of using Mastery Learning Approach on secondary school students' achievement in Chemistry found that Mastery Learning Approach facilitates students learning Chemistry better than the regular teaching method. This agrees with Ngesa (2002) who reported that Mastery Learning Approach resulted in higher student achievement in Agriculture than the

regular teaching method. He argued that the results were significant with regard to classroom Instruction and Teacher Education in Agriculture.

Mastery Learning Approach allows students to have enough time to master the prerequisites before making progress. Poor academic performance in physics could also be attributed to many factors among which teacher's strategy itself was considered as an important factor. Omosewo (1993) implies that the mastery of physics concepts might not be fully achieved without laboratory work. The teaching of physics without laboratory work may certainly result in poor academic achievement. However, Arlin and Webster (1983) raised an important issue regarding the use of instructional time in Mastery Learning. He argued that low achievers in grouped Mastery Learning do better because of corrective instruction, but faster students may be slowed down waiting for the other students.

Results from research studies carried out on Mastery Learning Approach (MLA) suggest that Mastery Learning Approach (MLA) yields better retention and transfer of material; yields greater interest and more positive attitudes in various subjects than non Mastery Learning Approaches (Kibler et al, 1981). The issue of teaching methods and their effect on secondary school science students' achievement has been a very important issue in the recent times. The importance of science and technology in the growth and development of any nation cannot be over-emphasized. It is evident that science and technology cannot thrive without using appropriate instructional methods. Future development of any nation in the fields of science depends on how well the science subjects are taught.

It is now being recognized that there are better ways to learn than through the traditional methods of instruction (Wood & Gentile, 2003). Universities and other institutions are beginning to show an increased awareness of the importance of the ways students learn. Many of the standard methods of conveying knowledge have been shown to be relatively ineffective on the students' ability to master and then retain important concepts. Learning through some methods of teaching is passive rather than active. The traditional methods (lecture, laboratory, recitation methods) do not tend to foster critical and creative thinking, and problem-solving. Students' scores in science subjects are usually below expectation (Olatoye, 2008). It has become necessary to seek strategies that will employ approaches that ensure and enhance better academic achievements of the students in the science subjects.

Physics is the backbone of all sciences and as science is considered a veritable tool widely recognized as being of great importance for the development of the economic well being of any nation then the knowledge of Physics cannot be over-emphasized Wambugu and Changeiywo (2007). This stressed the fact that Science and technology are interwoven. Therefore, the broad knowledge of science and technology is very important, especially as the world today has a lot of challenges ranging from natural and artificial phenomena. It's very noteworthy that today, with the extensive help of the collaborative works of scientists and technologists, the whole

world is considered as a single community served by electronic media and information technology hence, we can say that without the fundamental knowledge of science; the actualization of the benefits that science brings to the society will only be a mirage and the figment of our imagination. Physics is and will remain the fundamental bedrock of sciences, therefore basic knowledge and understanding of its concepts cannot be completely over-emphasized.

It will be very important to know that for an effective learning to take place, necessary teaching and learning techniques, quality instructions, evaluation, feedback and instructional materials and the likes should be rightly put in place as humans tend to learn better by hearing and seeing and doing rather than by reading. Therefore it is advisable that the use of well-defined instructional materials that aid pedagogic and learning process should be employed while teaching, especially of difficult concepts in physics. Many research works have been done on the performance of students exposed to different teaching and learning strategies.

Nigerian Secondary School Students who are taught physics by the "chalk and talk" lecture approach have repeatedly demonstrated poor student motivation and achievement in and from their physics education programme. This is evidenced by the poor results in both the in-school teacher-made physics examinations and in the external West African School Certificate physics examinations conducted by the West African Examinations Council. Noted that there are considerable data available which suggest that students, probably, do very poorly in physics because the method of teaching they are exposed to, mostly lecture method, does not enable them to go beyond the lowest hierarchy of learning outcomes in physics, the knowledge or factual recall level (ALI, 1975).

Statement of the problem

There has been low performance in physics in secondary school which is due to inability of students to understand and master topics and concepts in physics before proceeding to higher levels. Therefore, the use of Mastery Learning Approach is essential in overcoming this challenge. For a long time, Physics has been mystified as a difficult science subject. Students will shun Sciences particularly Physics when given an option (Aduda, 2003). That is, given a choice a student would rather drop Physics in favour of other Science subjects. This situation may not favour the nation's move towards the educational transformation agenda and the development of a scientific and technological nation as physics will be a necessary scientific tool to actualize this feat. The concern is that the performance in Physics is poor and the subject is less popular among students in secondary schools as compared to other science subjects.

Literature Review

The teaching of science in Nigeria began many years after the introduction of western education into Nigeria by the Christian Missionaries. Science first appeared in the Nigeria curriculum in 1859 when the Church Missionary Society (CMS) Grammar school in Lagos introduced a rudiment of science inform of nature study, schools like Saint Gregory's College

(Lagos), Baptist Training College (Ogbomosho) etc followed later in teaching nature study. Physics is one of the science subjects taught at the senior secondary level of the Nigeria educational system.

Mastery Learning Approach (MLA) involves breaking down the subject matter to be learned into units of learning, each with its own objectives. The strategy allows students to study material unit after unit until they master it (Dembo, 1994). Bloom (1984) in Wambugu and Changeiywo (2007) in their research on group instruction showed scores of students taught through MLA were around the ninety-eighth percentile, or approximately two standard deviations above the mean. They argued that students taught through Mastery Learning needed more time to master more advanced material. The Mastery Learning Approach used in this study stressed more of mastery of content, through corrective feedback and remediation rather than cooperative skills but the results showed that MLA is superior to RTM in terms of achieving higher scores. Research conducted on comparing effects of Mastery Learning alone, and regular teaching methods on student achievement Mevarech, (1985) showed that Mastery Learning was the indicator that significantly increased achievement. Wentling (1973) when comparing Mastery Learning and non Mastery Learning as to how feedback relates to achievement found that students who received feedback in MLA had higher achievement scores for both immediate achievement and long-term retention. However, time spent toward instruction showed no significant difference. The findings of this study concur with these results.

MLA allows students to have enough time to master the prerequisites before making progress. However, Arlin and Webster (1983) raised an important issue regarding the use of instructional time in Mastery Learning. He argued that low achievers in grouped Mastery Learning do better because of corrective instruction, but faster students may be slowed down waiting for the other students.

This would require the Physics teacher to be willing to use the time outside the normal school timetable for corrective procedures and retesting. The results also show that Mastery Learning Approach is beneficial to both boys and girls.

Mastery Learning Approach assumes that virtually all students can learn what is taught in school if their instruction is approached systematically and students are helped when and where they have learning difficulties Bloom, (1984).

The most important feature of Mastery Learning Approach is that it accommodates the natural diversity of ability with any group of students. With careful preparation and greater flexibility all students can be appropriately accommodated according to their respective levels of understanding and they can progress at their own rate Kibler et al (1981).

Mastery Learning Approach (MLA) is an instructional method, where students are allowed unlimited opportunities to demonstrate mastery of Content taught. MLA involves breaking down the subject matter to be learned into units of learning, each with its own objectives. Guskey (2007) reported that Bloom hypothesized that a classroom with a mastery

learning focus as opposed to the traditional form of instruction would reduce the achievement gaps between varying groups of students. In Mastery learning, "the students are helped to master each learning unit before proceeding to a more advanced learning task" (Bloom 1985) in contrast to "conventional instruction". Mastery learning uses differentiated and individualized instruction, progress monitoring, formative assessment, feedback, corrective procedures, and instructional alignment to minimize achievement gaps Bloom, (1971; Zimmerman & Dibeneditto, 2008). The strategy is based on Benjamin Bloom's *Learning for Mastery* model, which emphasizes differentiated instructional practices as strategies to increase student achievement.

Guskey (2007) noted that Mastery learning curricula generally consist of discrete topics which all students begin together. After beginning a unit, students will be given a meaningful and formative assessment so that the teacher can conclude whether or not an objective has been mastered. At this step, instruction goes in one of two directions. If a student has mastered an objective, he or she will begin on a path of enrichment activities that correspond to and build upon the original objective. Students who do not satisfactorily complete a topic are given additional instruction until they succeed. If a student does not demonstrate that he or she has mastered the objective, then a series of correctives will be employed. These correctives can include varying activities, individualized instruction, and additional time to complete assignments. These students will receive constructive feedback on their work and will be encouraged to revise and revisit their assignment until the objective is mastered.

In a mastery learning classroom, teachers follow a scope and sequence of concepts and skills in instructional units. Following initial instruction, teachers administer a brief formative assessment based on the unit's learning goals. The assessment gives students information, or feedback, which helps identify what they have learned well to that point (diagnostic) and what they need to learn better (prescriptive). Students who have learned the concepts continue their learning experience with enrichment activities, such as special projects or reports, academic games, or problem-solving tasks. Students who need more experience with the concept receive feedback paired with corrective activities, which offer guidance and direction on how to remedy their learning challenge. To be effective, these corrective activities must be qualitatively different from the initial instruction by offering effective instructional approaches and additional time to learn. Research on mastery learning across grade bands has shown positive cognitive and effective learning outcomes in students in general, including learners considered at risk of academic failure (Guskey & Gates, 1986). In addition, the successful use of mastery learning has positive effects on teachers as well, as their expectations for student achievement improve. The poor performance of students in science subjects especially physics has assumed a dangerous dimension. In the light of this, science educators need to seek suitable ways of tackling the current mass failure if they are to halt the drifts of students to arts and social science subjects WAEC Reports, (2008). Adegoke (2010) raised similar concerns in the level of

students' interest and performances in Physics in WAEC. According to him, on the average, less than 30% of total students who registered for senior secondary school certificate examination (SSSCE) between 2005 and 2009 entered for Physics (West African Examination Council (WAEC) 2009). More importantly, on the average, less than 45% of the students who sat for Physics between 2005 and 2009 in senior secondary school certificate (SSSCE) passed at credit level. With such trend in the achievement level of students in WAEC conducted examinations; it would seem difficult, if not impossible, for Nigeria to become a highly industrialized nation. In addition, we may not possibly realize our goals in science education unless and until we diagnose the factors contributing to these high failure rates in science subjects. We may even end up producing a large number of illiterate science students. Hence, an alternative method of instruction is needed.

In search for this, Gamache, Zhong and Maghfur (2009) reported that Mastery learning is the idea through which virtually all students can achieve expertise in a field if the field is analyzed into a hierarchy of component skills, and the students must master prerequisite skills before moving on to higher level skills. Kulik and Bangert-Drowns (1990), conducted a meta-analysis involving 108 evaluations of mastery learning programs. The outcome measures used were performance on examinations at the end of instruction, attitude towards instruction, attitude toward content, and course completion. Performance of students on examinations at the end of instruction showed positive effects on student achievement. They showed the mean effect size (Cohen's d) of 108 studies was 0.52, which is considered a moderately large effect size.

The benefits of mastery programs appear to be relatively enduring, not just short-term, effects. Mastery learning programs also seem to have a positive effect on student attitudes. Mastery learning students are more satisfied with the instruction they receive and more positive toward the content they are taught than are students in conventional classes. In a mastery learning environment, the teacher directs a variety of group-based instructional techniques, with frequent and specific feedback by using diagnostic, formative tests, as well as regularly correcting mistakes students make along their learning path. Assessment in the mastery learning classroom is not used as a measure of accountability but rather as a source of evidence to guide future instruction. A teacher using the mastery approach will use the evidence generated from his or her assessment to modify activities to best serve each student. Teachers evaluate students with criterion-referenced tests rather than norm-referenced tests. In this sense, students are not competing against each other, but rather competing against themselves in order to achieve a personal best.

In general, mastery learning programs have been shown to lead to higher achievement in all students as compared to more traditional forms of teaching (Anderson, 2000; Gusky & Gates, 1986). Despite the empirical evidence, many mastery programs in schools have been replaced by more traditional forms of instruction due to the level of commitment required by the teacher and the difficulty in managing the classroom

when each student is following an individual course of learning (Anderson, 2000; Grittner, 1975). Despite the conclusive evidence that an appropriately instituted mastery approach to instruction yields improvement in student achievement, there is a strong movement against it. Critics of mastery learning often point to time constraints as a flaw in the approach. Those that favor breadth of knowledge over depth of knowledge may feel that it is more important to “cover” a lot of material with little detail rather than focus more energy on ensuring that all students achieve learning goals.

Many teachers are hesitant to institute a mastery learning approach in their classroom because of fears that they may get behind in their lessons. Some critics argue that allowing some students extra time to complete their work is unfair. They argue that differentiated instruction is inherently unfair because the students who receive extra feedback and time are somehow given an advantage over the students who master the objectives the first time. Most of this criticism stems from a misunderstanding of Bloom’s approach. In Bloom’s ideal classroom, the institution of a mastery learning approach would eventually lead to a drastic decline in the variation of student achievement. Students who require more correctives initially would “gain direct evidence of the personal benefits the process offers” (Guskey 2007).

Theoretical Framework

The concept of mastery learning can be attributed to the behaviorism principles of operant conditioning. According to operant conditioning theory, learning occurs when an association is formed between a stimulus and response (Skinner, 1984). In line with the behavior theory, mastery learning focuses on overt behaviors that can be observed and measured (Baum, 2005). The material that will be taught to mastery is broken down into small discrete lessons that follow a logical progression. In order to demonstrate mastery over each lesson, students must be able to overtly show evidence of understanding of the material before moving to the next lesson (Anderson, 2000).

Purpose of the Study

The purpose of this study is twofold:

1. Compare the achievement of students’ taught in Physics using Mastery Learning Approach (MLA) with students taught using the Conventional teaching methods (CTM).
2. Determine relationship between students’ attitudes towards physics and their achievement.

Research Questions

This study proffers solution to the following questions:

1. Does mastery learning approach have effects on students’ achievement in secondary school physics?
2. What is the relationship between students’ attitude and their achievement in Physics?

Hypotheses

The following null hypotheses were tested at .05 level of significance

H01: There is no significant difference between the physics achievement of students who are exposed to Mastery Learning Approach (MLA) and those who are exposed to the Conventional Teaching Method (CTM).

H02: There is no significant relationship between the attitude of students towards Physics and their achievement in physics.

Methodology

The study is a non-randomized non-equivalent pretest, post test quasi-experimental design. The population consists of S.S.II Physics Students in Bariga and Shomolu Local Government Area of Lagos State. One Hundred and sixty (160) students (of 50 girls and 110 boys) of age range 14-18 were selected through stratified random sampling. The secondary schools used are co-educational type with qualified physics teachers and are widely separated from one another. The Mastery Learning Method was used for the experimental group while the conventional teaching method was used for the control group. For the collection of data, a fifty item Physics Achievement Test (PAT) of multiple choice questions selected from the concepts of Scalar and Vector Quantities, Speed, Velocity and Acceleration, Motion, Motion under gravity, Projectile motion, Force, Fluid at rest and in motion, Pressure, heat, temperature and its measurement and a questionnaire of 20 questions were administered to both the experimental and control groups. In the Physics Achievement Test (PAT), the students were expected to select the correct answer from the four options in the questions. The (PAT) was used to measure the achievement of students in both pre-test and post-test while the questionnaire consisted four-scale options (Strongly Agreed, Agreed, Strongly Disagreed, Disagreed) which the respondent is expected to choose from the options the one that best suits their views. The instruments were both face and content validated. Its empirical validity were ensured through pilot testing in a neutral school using split half method for PAT and r value was calculated to be 0.7 and r for questionnaire was calculated to be 0.83 using chronbach alpha

The study was carried out in various stages. The first stage in the study involved the identification and familiarization of the subject schools including a description of the objectives of the research to the physics teachers in the respective schools and their training on the method to be used in teaching the students. A pre-test was administered to both experimental and control groups before the introduction of the treatment to the experimental group. The post-test was then administered to both groups after they have been exposed to the independent variables (mastery learning approach and the conventional chalk and talk method).

In all, a total number of 160 Physics Achievement Test (PAT) was distributed to the students in the pretest and post test in the four selected schools which the research work was conducted. 40 Physics Achievement Test (PAT) was administered to each of the four schools in the pretest and in the post test while 160 Questionnaire was also distributed to

the students during the pretest and post test in the four selected schools. 40 Questionnaires were administered to each of the four schools in the pretest and in the post test.

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Data Analysis

Testing of Hypotheses

H₀₁. There is no significant difference between the physics achievement of students who are exposed to Mastery Learning Approach and those who are exposed to the Conventional Teaching Method

Table 1: (ANOVA) showing the difference in PAT for students exposed to MLA and those exposed to CTM

		Sum of Squares	df	Mean Square	F	Sig.
PRETEST	Between Groups	12942.006	1	12942.006	410.409	.000
	Within Groups	4982.438	158	31.534		
	Total	17924.444	159			
POSTTEST	Between Groups	18062.500	1	18062.500	836.846	.000
	Within Groups	3410.275	158	21.584		
	Total	21472.775	159			

Decision: reject H₀₁

Table 2: T- TEST (Independent Samples Test)

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% confidence interval of the difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
POST TEST Equal variance assumed Equal variances not assumed	.046	.830	28.928	158	.000	21.25000	.73458	19.79915	22.7008
			28.982	157.199	.000	21.25000	.73458	19.79909	22.7009
PRETEST Equal variance assumed Equal variances not assumed	.016	.899	20.259	158	.000	17.98750	.88790	16.23382	19.74118
			20.259	157.996	.000	17.98750	.88790	16.23382	19.7411

The tables 1 and 2 above show the ANOVA and independents t-test results of pretest and post-test scores of students' Physics Achievement Test. The table shows that there was a significant difference between students exposed to Mastery Learning Teaching method and Conventional teaching methods.

* **Significant at $\alpha \leq 0.05$** , the F factor is significant at $p < 0.05$

This shows that performance of students exposed to Mastery Learning method and those exposed to Conventional methods are not the same. Students in experimental group performed relatively better than students in control group therefore, hypothesis Ho1 which says that “there is no significant difference in physics achievement between students who are exposed to Mastery Learning Approach and those who are exposed to the Conventional method” is rejected. The table also provides answer to research question one that says does mastery learning approach have effects on students’ achievement in secondary school physics?

H0₂: There is no significant relationship between the attitude of students towards Physics and their achievement.

The Pearson correlation was used to test the relationship between students’ attitude and their achievement in Physics.

Table 3: Test of relationship between the attitude of students towards physics and their achievement

		POSTTEST	PQ
POSTTEST	Pearson Correlation	1	.903**
	Sig. (2-tailed)		.000
	N	160	160
PQ	Pearson Correlation	.903**	1
	Sig. (2-tailed)	.000	
	N	160	160

** . Correlation is significant at the 0.05 level (2-tailed).

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In table 3 Correlation is significant at the 0.05 level (2-tailed). The Pearson correlation analysis shows that the relationship between the attitude of students towards Physics and their performance is significant, positive and very strong. This means that students with positive attitude towards Physics will definitely perform better than students with negative attitudes therefore, hypothesis two H_{02} which says that "There is no significant relationship between the attitude of students towards Physics and their achievement" is rejected. Table 3 has provided answer to research question two which says "what is the relationship between students' attitude and their achievement in Physics?" There is a positive and strong relationship between students' achievement and attitude towards physics.

Discussion and Conclusion

This study was conducted in order to find out the effect of mastery learning approach on students' achievement in physics the result of the analysis shows that there is a significant difference between students exposed to Mastery Learning Approach and students exposed to the Conventional Teaching method. Students exposed to Mastery Learning Approach performed far better than students exposed to the Conventional Teaching methods. This may be due to the fact that Mastery Learning Approach used in this study stressed more of mastery of content, through corrective feedback and remediation. Hence they have enough time to master the contents of the lesson presented thoroughly; possessing high mastery level. This is in line with Bloom (1976) assertion which believes that an essential hypothesis in Mastery Learning method is that if there is suitable opportunity for education and there is enough time, all learners can learn all educational targets and have mastery over them.

This result is similar to the findings of Wachanga and Gamba (2004) that investigated the effects of using Mastery Learning Approach on secondary school students' achievement in Chemistry and found that Mastery Learning Approach facilitates students learning of Chemistry better than the regular teaching method. It also agrees with the findings of Ngesa (2002) who reported that Mastery Learning Approach resulted in higher student achievement in Agriculture than the regular teaching method. Bloom (1984) in Wambugu and Changeiywo (2007) in his research on group instruction showed scores of students taught through Mastery Learning Approach were around the ninety-eighth percentile, or approximately two standard deviations above the mean. He argued that students taught through Mastery Learning needed more time to master more advanced materials.

Also LeDuc(2001) asserted that the purpose of mastery learning method is that all students achieve high levels of learning. Therefore, one should concentrate on high level mental skills and processes while learning and implementing this learning method. His results showed that there was a difference between students exposed to Mastery Learning Method and the Conventional Teaching method. This result is further in line with the findings and recommendation of Awotunde and Bot(2003), Yildrin and Adyin (2005), Aderemi (2006) and Kazu, Kazu and Ozedemi (2008) who found that

mastery learning is effective and if effectively employed by classroom teaching would improve students' achievement in a given task. This means that Mastery Learning approach increases the performance of students exposed to it than students exposed to the regular teaching strategies.

The result of hypothesis two indicated a positive and strong significant relationship in the attitude of students towards Physics and their performance. Students who have positive attitude towards Physics performed better than students who have negative attitudes towards Physics. This result agrees with the findings of Akinbobola (2009) who found that an improved students' attitude in physics will enhance students' performance in the subject. This means that Mastery Learning Approach teaching method is better in increasing the performance of students.

Conclusion

This study has provided an empirical data on the effectiveness of Mastery Learning Approach teaching strategy in enhancing academic achievement in physics. This means that the use of Mastery Learning Approach in the teaching of Physics at secondary school level can address the poor performance and the low enrolment in the subject.

Curriculum developers will find this study helpful in designing appropriate instructional strategies involving Mastery Learning, which would enhance the learning of Physics.

Recommendations

Based on the findings of the study and conclusion reached, the following recommendations were made:

- (1) Physics teachers should adopt Mastery Learning Approach as an effective teaching strategy in order to enhance students' achievement in Physics in schools as well as in Senior Secondary School Certificate Examination level. This will encourage students to offer and study physics and its related disciplines in their post secondary education
- (2) Seminars, workshops and conferences should be organized for physics teachers to update them with the use of Mastery Learning Approach strategy.
- (3) Teacher trainers should integrate Mastery Learning Approach among instructional strategies used.
- (4) Teacher educators will find the study useful in developing programs aimed at producing teachers capable of structuring learning environment that can equalize their interaction with learners enabling greater learner participation, satisfaction and further academic aspirations.
- (5) More teachers should be recruited to reduce class size as the current large class size may hinder effective implementation of the MLA as an instructional strategy. The features of Mastery Learning Approach teaching method suggest that it can be easily implemented in the existing school setting. However it should be realized that the time needed to develop the materials is considerable and that the development of learning objectives along with corresponding formative tests and corrective activities is an enormous burden on the teachers.

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