COMPARATIVE EFFECTS OF MASTERY LEARNING AND PEER-ASSESSMENT TEACHING STRATEGIES ON GHANAIAN SENIOR HIGH SCHOOL STUDENTS' ACHIEVEMENT IN MATHEMATICS

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Abstract

Globally mastery learning and peer-assessment strategies in teaching, learning, and assessment are critical for improving students' mathematics achievement. However, the extent to which teachers implement these strategies remains elusive. The paper focuses on the comparative effects of mastery learning and peer-assessment strategies on Ghanaian senior high school students' achievement in mathematics. The non-equivalent pre-test and post-test control group 3x2x2 factorial quasi-experimental design was adopted for the study. Three public senior high schools were randomly sampled to participate in the study and a total of one hundred and twenty-five (125) students made up of ninety (90) in the experimental groups and thirty-five (35) in the control group from three intact classes were selected. Two mathematics achievement tests, with reliability coefficients of 0.78 and 0.89 were developed by the researcher for data collection. Mastery learning and peer-assessment modules were also developed and used by the researcher for the intervention. The two teaching strategies modules developed were validated by three experts using the percentage of agreement method which yielded 79% and 85% respectively. ANCOVA was used to test the hypotheses at a 0.05 level of significance. Findings showed a significant comparative effect of mastery learning and peer-assessment teaching strategies on students' achievement in Mathematics with better performance of subjects in mastery leaning group, followed by those in peer-assessment group. Significant effect of mastery learning and peer- assessment of teaching strategies on Senior High School students' achievement in Mathematics based on gender was revealed. However, effect of mastery learning and peer-assessment of teaching strategies on Senior High School students' achievement in Mathematics is independent of age. It was recommended among others that training should be given to mathematics teachers on how to effectively use both teaching strategies in the mathematics classroom if better performance is desired.

Key Words: Mastery learning. Peer assessment, Gender, Age, Senior High School, and Mathematics achievement.

Introduction

Mathematics as a discipline plays an important role as it serves as an impetus to technological and national development, which has become an imperative in the developing nations of the world today. A study of mathematics helps build reasonable, thoughtful, and productive citizens in society who will understand the natural world and also helps society to approach challenges in life and the workplace systematically and logically (Paul, 1993). Since every individual requires the knowledge of mathematics to function effectively and efficiently in today's world irrespective of his/her job or profession daily, the demand for mathematical competence needs to be a concern for the school systems. Mathematics was made a compulsory subject to be taken and passed by everybody from basic up to secondary education in Ghana.

Ifamuyiwa and Akinsola (2008) stated that mathematics encourages the habit of self-reliance and assists learners to think and solve their problems themselves lest they continue to be the prey of persons who gain by their lack of competence. All mathematical topics beyond computational skills also have one good habit or trait they inculcate in the students. Topics like geometry and logical reasoning, for example, demand some amount of reasoning and concentration from individuals so that they carry in their minds the given fact and the required facts and be able to disregard all outside interference until they establish a relationship between the known and the required facts. Such topics and many others in algebra help people reason logically and realize that facts can be absolutely proven and so consequently develop the habit of desiring and demanding that in their affairs with others. Proofs also help learners reason deductively and apply that knowledge in deducing the cause and effect of things around them and within their environment (Okafor & Anaduaka, 2013).

This links the world as a society of social learning and data transferring. However, according to Sapapong (1998) teaching and learning style, today is more on data entry, remembering, and emphasis on data transfer in a classroom which results in learners being inexperienced, and does not stimulate the learners to learn new things. Moreover, students' performance in mathematics is also associated with age thus, the age of students is believed to have a positive effect on their academic performance. According to (Nam, 2014) age is a factor in determining the academic achievement of students and it does so only at the early stages. Others are of the view that age differences in academic achievement only exist at the old age (high school) stage (Black, Devereux & Salvanes, 2011). Little is known about the process through which older sibling relationships may influence adolescents' academic achievement. Given the importance of sibling closeness, positive sibling warmth and support were hypothesised in a study to be positively associated with adolescents' academic achievement that is as adolescents develop the amount of time, they spend with their peers increases (Ryan, 2001). Peer relationships during this period with older siblings are widely viewed as more influential than those formed during early childhood. Negative friendship qualities encompass disloyalty, hostility, and

competition (Burk & Laursen, 2005). Positive friendship qualities encompass companionship, intimacy, warmth, closeness, and trust (Burk & Laursen, 2005).

A study by Taylor and Wong (1996) on the topic 'Gender differences in the impact of peer influence and peer orientation on African-American adolescents' school value and academic achievement'. They found that gender difference does exist in African-American adolescents' perception of peer and peer orientation and there are also gender differences in the relationship between peer influence, academic value, and grade point average in favour of males. There is a widespread view that students' achievements (e.g. in Mathematics) generally are poor. Several researchers have also attributed this to the teaching strategies employed by teachers. Therefore, the teachers' correct understanding of appropriate teaching methods and effective factors influence many motivational variables of learners for example the tendency to think critically. The National Research Council in the USA (2000) proposed the use of the "inquiry" method in teaching and learning. An inquiry method is where students are provided with the available and adequate resources in their environment and they explore, raise questions, and come out with explanations or reasons for certain happenings in the environment. Adesoji (2008) advocated the use of the discovery method in the teaching and learning process which motivates students to make self-discovery and be as self-reliant as possible. Other teaching methods include mastery learning, peer-assessment skill, and critical thinking skill among others.

This study focuses on mastery learning and peer assessment as two methods of teaching and learning that help students follow the teacher in solving mathematical problems and mastery of the subject. There is growing rhetoric in research on the question of whether to involve students in classroom assessment through self-and peer- assessment. According to Black and Williams (1998b), peer assessment is a process of establishing rapport and creating awareness of the key processes, giving out samples of student's work from another class, distributing instructional rubrics (success criteria), and explaining how to grade students' work to all participants. Andrade and Valtcheva (2009) opined that within the global assessment for learning movement peer and self-assessment have been promoted as strategies that actively involve pupils in the process of assessment. Peer and self-assessment in primary and secondary schools have been shown to engage and empower students to develop pupils' self-regulation and meta-cognition. Cho and Cho (2011), stated that positive peer assessment is beneficial only if it incorporates task-related information rather than just effective comments. It also allows students to assess sample work using instructional rubrics as training and plenary discussion of the sample work on approaches and change. According to Cobbinah (2018) in peer assessment, learning effectively occurs within interactive peer groups as multiple learners shared understanding through collaboration.

Topping (2003) stated that there are complexities in the form of the peer-assessment format in that it requires an understanding of the goals of the tasks, the criteria for success, and the ability to make a judgment about the relationship of the

product or achievement. He attributed these complexities to the fact that the peer-assessment skills comprised a set of constituents' skills that a student must have to be able to implement assessment effectively. Peer assessment is much more than students' marking their own or each other's work. To improve learning, it must be an activity that engaged students with the quality of their work and helped them reflect on how to improve it. Peer assessment enabled students to give each other valuable feedback so that they can learn from and support each other to improve their achievements (Ryan, Marshall, Porter & Jia 2004). Cobbina,, Daramola and Owolabi, (2017) submitted that there is significant effect of peer-assessment on students Mathematics achievement Despite numerous advantages of peer-assessment mentioned within the pedagogical discourse, studies have reported that its success i.e., the extent to which students utilize feedback to improve their work and ultimately their learning is conditioned to several interrelated factors including, the type of feedback, the source of feedback and students' perceptions of the usefulness and importance of the feedback (Van Zundert, Sluijsmans, & Van Merrienboer,2010)

Mastery learning, on the other hand, refers to a pedagogical approach that combines the qualities of conventional group-based teaching and one-to-one individual tutoring to achieve better academic performance more realistically and cost-effectively (Wong & Kang, 2012).In the same manner, Owolabi (2000) opined that mastery learning provides opportunities for most students to master what they are taught through the process of formulating instructional objectives, developing criteria for their attainment, and remediation. Guskey, (2007) stated two fundamental features of mastery learning as feedback (both corrective and enrichment) and alignment of objectives. Guskey (2009) observed that extensive research evidence gathered in Asia, Australia, Europe, South America, and the United State, showed that careful and systematic application of mastery learning principles can lead to significant improvements in students learning. In the same way, Owolabi, Olatunji and Sowumi (2013) submitted that mastery learning improves students' performance in Economics. Udo and Udofia (2014) and Adeyemo and Babajide (2014) all affirmed that the mastery learning strategy enhances students' academic achievement more than the conventional method of teaching.

Iserameiya and Agbonghale's (2018) findings revealed that both males and females taught with MLS performed significantly higher in their posttest academic achievement in BTE than those taught with Direct Instruction Strategy (DIS). However, Frick, Frick, Coffman, and Dey (2011) argued that mastery learning was more stressful and could diminish individual self-esteem, as slower students were perceived to be intellectually inferior for participating in correctives. In the same way, Adeyemi (2007) indicated in his findings that the mastery learning approach does not significantly enhance students' performance. The item response and achievement motivation theories underpin this study. Lussier and Achua (2007) stated that achievement motivation theory attempts to explain and predict behavior

and performance based on a person's need for achievement, power, and affiliation. Again, the individual can work towards their highest performance level. Item response theory (IRT) on the other hand is a model relating to the probability of an examinee's response to a test item to an underlying trait or ability. Therefore, the probability of a correct response is determined by the item's difficulty and the subject's ability (Anastasia & Urbina, 2002). These two theories are relevant here because the success of an individual depends on the person's desire to achieve higher height but that will ultimately depend on the ability of the person to perform.

Ghanaians' students' performances in core mathematics over the years in WASSCE are poor and parents, teachers, and the society as a whole are worried and wondering how this abysmal performance of students in the western region especially could be solved. Ghanaian students' performances in Core Mathematics for the past five years starting from 2016 to 2020 were 32.8%, 42.7%, 38.3%, 65%, and 65.7% respectively. It could be seen that for the years 2016/17 and 2018 the performances were poor but there was a shape increase in performances in the years 2019 and 2020. Despite this shape increase, there is still work to be done because a whopping percentage of 35% failed the exams and could not continue to the next level of their education and that calls for an effort to be put in place solution to the situation. This is because it is required for all school going age children to be educated to their fullest potential. As earlier stated, the key to the possible solutions being offered by stakeholders is the teaching and learning method. The effectiveness of the two methods suggested cannot be doubted but the comparative advantage of one over the other has not been established.

Moreover, it is not clear whether gender and age have interaction effects on the student's mastery of learning and peer-assessment strategies in their achievement in mathematics. The literature reviewed so far was indicative that individual factors have been studied and their effects on students' achievement were established. Cobbinah (2018) studied the comparative effects of critical thinking and peer assessment skills and found that they were both effective teaching methods and recommendations for the use of either of them. However, the comparative study of mastery learning and peer assessment, as well as the gender effect on students' mathematics achievement, have not been investigated. A study by Taylor and Wong (1996) on the topic 'Gender differences in the impact of peer influence and peer orientation on African-American adolescents' school value and academic achievement'. They found that gender difference does exist in African-American adolescents' perception of peer and peer orientation and there are also gender differences in the relationship between peer influence, academic value, and grade point average in favour of males. Again, there was a strong negative relationship between GPA and negative peer orientation suggesting that adolescents who have a high level of conformity to unconventional peer behaviours than young students have lower GPAs than those who have a lower level of conformity. An indication is that these individuals have peer groups who do not have a large number of unconventional values or behaviours. In addition, there is a significant gender

difference, such that boys' grades are more strongly affected by peer orientation than girls

Therefore, the researcher looked at the comparative effects of mastery learning and peer assessment and their effects on students' achievement in mathematics as well as the effects of age and gender. It appears to the researcher's knowledge that no such research has been done in the Western Region of Ghana. Therefore, this motivated the researcher to undertake the study.

Therefore, the purpose of this study was to determine the effects of mastery learning and peer-assessment teaching strategies on Ghanaian senior high school students' achievement in Mathematics and the effect of gender and age on students' achievement in Mathematics.

Research Hypotheses

H_{01}: There is no significant comparative effect between mastery learning and peer-assessment of teaching strategies on students' achievement in mathematics

H_{02}: There is no significant effect of mastery learning and peer-assessment of teaching strategies on Senior High School students' achievement in Mathematics based on gender

H_{o3}: There is no significant effect of mastery learning and peer- assessment of teaching strategies on Senior High School students' achievement in Mathematics based on age

Methodology

The research design for this study was a 3x2x2 factorial quasi-experimental design. The independent variables in the study are mastery learning and peer-assessment teaching strategies, while age and gender are intervening variables, and achievement in Mathematics is the dependent variable. Three intact classes were used for the study. In this design, the dependent variable was measured both before and after the treatment or intervention as depicted below

Assignment	Group	Pretest	Treatment		Posttest
Experimental	1	O_1	X_1	(Gender) (Age)	O_2
Experimental	2	O_1	X_2		O_2
(Control)	3	O_1	—		O_2

Figure 1: 3x 2 x 2 Complex Factorial Quasi-Experimental Design

Group = Mastery Learning, Peer –Assessment and Control
Gender = Male and Female
Age = 14-16 years and 17-19 years
Key: O_1 = first observation/Pre-test,
X_1 = Mastery Learning)

X_2= Peer Assessment
$O_{2=}$second observation/Post test
---------- = intact groups no randomization

The diagrammatic expression of the treatment strategies shown in figure 6 indicates that experimental groups 1 and 2 were pretested, after which they underwent experimental treatment and the post-test was administered to them. For control group 3, the participants in the group were pre- tested received the traditional method of teaching (no treatment was administered) and subjects responded to post-test instruments. The use of both pre-test and post-test helped to establish, the temporal precedence of the independent variable to the dependent variable. This gave the researcher more confidence when inferring that the independent variables were responsible for changes in the dependent variable. Secondly, the use of a pre-test allowed the researcher to measure between groups' differences before exposure to the intervention. This substantially reduced the threat of selection bias by revealing whether the groups differed on the dependent variable before the intervention (Kaufman & Kaufman, 2005). The 3x2x2 factorial quasi-experimental design was used because, in a school or natural setting, it may not be possible to randomly assign students to groups since the headmasters/mistress did not like their classes to be disorganized for research. This design helped in comparing groups against one another, hence it automatically ruled out selection-maturation interaction biases. The mastery learning, peer assessment, and control group comprised 47, 43, and 35 students respectively.

The population for this study comprised all Senior High School Students in the Western Region of Ghana. The target population consisted of all male and female Senior High School form two students. Multi stage sampling procedure was employed. At first form two students were purposively sampled because they were the only students who were on campus at the time because of the double track and also based on the fact that they had spent a minimum of three and half semesters in the Senior High School and therefore must have covered reasonable content area in Core Mathematics and acquired some basic mathematical skills.

The purposive sampling technique was used to select two districts (Elebemlle and Evalue Gwira) from the selected region. This was done against the background that the two districts had had students with low pass rates in mathematics in the past years. Only co-educational schools and Arts classes (Arts classes that do not do elective mathematics) were purposively chosen, co-educational because both the male and female students received the tuition in the same classroom. Also a simple random sampling technique was used to select schools, two sampled schools were exposed to experimental treatments while the third constituted the control group. Three intact classes were chosen from the schools selected through simple random sampling from the same programme to ensure uniformity and fairness. A total of 125 students were sampled from three schools namely Nsein Senior High, Nkroful Agriculture Senior High, and Esiama Senior High and Technical schools.

The following instruments were used for the study. Personal Data Questionnaire (PDQ), Mathematics Achievement Test (MAT), two forms of the MAT were used, one for pre-test and the other for post-test**,** and Teaching Modules (TM)). A personal Data Questionnaire (PDQ) was designed by the researcher to generate the participants' bio-data which include, age and gender. Two mathematics Achievement Tests (MAT): One form of Multiple-Choice Questions (MCQ) and essay questions were adapted by the researcher from the WASSCE test items from 2018- to 2021. The MCQ consisted of 40 items, each with 4 options and 3 essay questions.

Teaching modules were also developed by the researcher for both peer assessment and mastery learning teaching strategies.

A pre-test of the MAT instruments was done to validate it. Content validity was established by seeking the opinions of experts in Mathematics Education and lecturers in the Department of Mathematics and Science Education of the University of Cape Coast and other professionals were sought in restructuring some of the questions in the MAT. Three of the Senior lecturers in the Science and Mathematics Education Department were selected to help in the rating of the test items in terms of their content relevance, and the objectives of the study. The two mathematics achievement test instruments had reliability coefficients of .89 and .78

To check the validity of the instruments for the study, a table of specifications was used, and also three Mathematics senior lecturers in the Department of Mathematics Education two from the University of Cape Coast-Ghana and one from the University of Education Winneba were asked to check and validate the items. Their comments and notes were discussed and based on the discussion the researcher made some changes. To calculate the degree of agreement, the researcher used the percentage of agreement approach. In this approach, the researcher looked at how the three lecturers either agreed or disagreed with each item. The three lecturers' percentage of agreement rating for the pre-test items was 80%. For the post-test items, the percentage of agreement rating was 87.3%. For the teaching modules (TM) the percentages of agreement of 85% and 79% were given by the three raters as the content validity of the mastery learning and peer assessment teaching modules respectively. According to Darwaza (1997) in educational research an acceptable degree of agreement coefficients exceeding 75% is desirable.

Results

In this study, an attempt was made to find out the effects of mastery learning and peer assessment teaching strategies on Ghanaian senior high school students' achievement in Mathematics in the Western Region of Ghana. One hundred and twenty-five (125) students from three public senior high schools participated in the study. Table 3 shows the distribution of the study participants.

Pre-test and post-test scores using the Mathematics Achievement Test were collected and used for data analysis. Three null hypotheses were generated and tested using

analysis of covariance (ANCOVA). The results are presented according to the hypotheses which guided the study.

Table 1. Post-Test Scores of Participants across Gender, Age, and Treatment Groups

Groups	Male			Female			Grand Total
	14 -16			14 – 16	17 – 19	Total	
ML	71.75	69.20	70.09	66.40	58.00	62.67	66.08
PA	55.60	59.50	57.33	64.21	64.63	64.33	60.89
CTRL	49.55	46.73	48.14	45.71	48.38	47.13	47.73
Total	48.14	59.65	58.78	61.85	57.14	59.39	58.45

Results from Table 1 show the mean scores of the post-Mathematics Achievement Test based on the groups, ages, and gender of the participants. The mastery learning group had a mean score of 70.09 for male students and 62.67 for female students. While in the peer-assessment group, the male students' mean score is 57.33 as compared to 64.33 for the female students. The male students had higher mean gain than the female in mastery learning. Table 2 also shows that students who received training in mastery learning and peer-assessment skills show differences in their achievement based on gender. That is, in mastery learning, the mean score for students between ages 14 and 16 years is 71.75 while that for between ages 17- 19 years is 69.20. In the same vein, the students' peer-assessment mean score between ages 14 and 16 years is 57.33 and between 17 and 19 years is 64.33. Finally, Table 2 shows the overall post-test mean scores of the critical mastery learning (66.08), peer assessment (60.89), and the control group (47.73) which is in favour of the treatment groups (ML and PA)

Hypothesis One: There is no significant comparative effect of mastery learning and peer- assessment teaching strategies on students' achievement in Mathematics.
The independent variables were mastery learning and peer-assessment teaching strategies while the dependent variable was an achievement in Mathematics. Participants' scores on the pre-intervention administration of the Mathematics Achievement Test were used as the covariate in this analysis. Preliminary checks were conducted to ensure that there was no violation of the assumptions of normality, linearity, homogeneity of variances, homogeneity of regression slopes, and reliable measurement of the covariate.

Table 2a: ANCOVA Post-test ` Achievement in Mathematics Scores among the Groups

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	12229.201[a]	12	1019.100	9.144	.000	.480
Intercept	7728.747	1	7728.747	69.350	.000	.368
Pretest	2889.051	1	2889.051	25.923	.000	.100
Group	1468.550	2	734.275	6.589	.002	.179
Age2	6.603	1	6.603	.059	.808	.000
Gender	486.446	1	486.446	4.365	.039	.035
Group * Age2	592.722	2	296.361	2.659	.074	.043
Group * Gender	16.874	2	8.437	.076	.927	.001
Age2 * Gender	24.385	1	24.385	.219	.641	.002
Group * Age2 * Gender	99.364	2	49.682	.446	.641	.007
Error	13262.095	119	111.446			
Total	491021.000	132				
Corrected Total	25491.295	131				

Hypothesis One: There is no significant comparative effect of mastery learning and peer-assessment teaching strategies on students' achievement in Mathematics.

The independent variables were mastery learning and peer-assessment teaching strategies while the dependent variable was an achievement in Mathematics. Participants' scores on the pre-intervention administration of the Mathematics Achievement Test were used as the covariate in this analysis. Preliminary checks were conducted to ensure that there was no violation of the assumptions of normality, linearity, homogeneity of variances, homogeneity of regression slopes, and reliable measurement of the covariate.

a. R Squared = .480 (Adjusted R Squared = .427)

Table 2b: result of turkey post hoc test

Group	N	Subset		
		1	2	3
Control	37	47.73		
Peer Assessment	45		60.89	
Mastery learning	50			66.08
Sig.		1.000	.101	

The results as shown in Tables 2a, and with Mathematics Achievement Test, F (2,119) = 6.589, p = 0.000, (partial eta squared = 0.179). The result shows a significant comparative effect of mastery learning and peer-assessment teaching strategies on students' achievement in Mathematics. This eta value indicates that the

two treatments contributed 17.9% to the student's achievement in Mathematics. The post hoc test results presented in Table 2b show significant differences exist between the treatment group (PA and ML) and also the control group. An indication is that the mastery teaching strategy group has a comparative advantage over those exposed to peer-assessment teaching strategy in terms of its effect on students' achievement in Mathematics. Though there was a statistically significant difference in the treatment groups in favour of the mastery learning strategy, peer assessment teaching was however also better than the traditional (conventional) method of teaching.

Hypothesis Two: There is no significant effect of mastery learning and peer-assessment of teaching strategies on Senior High School students' achievement in Mathematics based on gender

It was shown on Table 2a that there was significant effect of mastery learning and peer- assessment of teaching strategies on Senior High School students' achievement in Mathematics based on gender, $F(1,119) = 4.365$, $p = 0.039$. On Table 1 the mean scores for males (70.09) and females (62.67) in the mastery learning group showed that male students have an advantage over their female counterparts. However, in the peer-assessment teaching strategy group, the mean score for females (64.33) was better than that of males (57.33).

There was a relationship between the pre-test and post-test scores on the achievement in Mathematics test based on gender as indicated by a partial eta squared value of 0.035. This eta value indicates that gender has a small significant influence on the achievement of students in the two treatments, it contributed only 3.5% to students' achievement in Mathematics

Hypothesis Three: There is no significant effect of mastery learning and peer-assessment of teaching strategies on Senior High School students' achievement in Mathematics based on age

Results from Table 3a also show that there was There is no significant effect of mastery learning and peer-assessment of teaching strategies on Senior High School students' achievement in Mathematics based on age, $F(1,119) = 0.059$, $p = 0.808$. Thus, mastery learning and peer-assessment teaching strategies training were effective in improving students' achievement in Mathematics irrespective of age differences. Partial eta squared value of 0. 000 confirmed no significant effect of the treatments based on age. This eta value attests to the fact that age differences only contributed 0.0% to students' achievement in Mathematics.

Discussion of Findings

A significant comparative effect of mastery learning and peer-assessment teaching strategies on students' achievement in Mathematics was discovered in this study. These findings support the findings of Guskey (2009) who observed extensive

research evidence gathered in Asia, Australia, Europe, South America, and the United State, showing that careful and systematic application of mastery learning principles can lead to significant improvements in students learning. In the same way, Owolabi, Olatunji and Sowumi (2013), Udo and Udofia (2014) and Adeyemo and Babajide (2014) all affirmed that the mastery learning strategy enhances students' academic achievement more than the conventional method of teaching. The finding however,disagrees with Adeyemi (2007) findings that the mastery learning approach does not significantly enhance students' performance. About the peer assessment, the finding was also in line with that of Cho and Cho (2011) submission stated that positive peer assessment is beneficial only if it incorporates task-related information rather than just effective comments. It also allows students to assess sample work using instructional rubrics as training and plenary discussion of the sample work on approaches and change. Again, Andrade and Valtcheva (2009) opined that within the global assessment for learning movement peer and self-assessment have been promoted as strategies that actively involve pupils in the process of assessment. Peer and self-assessment in primary and secondary schools have been shown to engage and empower students to develop self-regulation and meta-cognition. Perhaps the high mean score in the mastery learning groups could be due to students' familiarity with the teaching method as against the peer-assessment teaching strategy which was new to them.

It was revealed from the study that there is a significant effect of mastery learning and peer- assessment of teaching strategies on Senior High School students' achievement in Mathematics based on gender. Male students in mastery learning group significantly performed better than their female counterparts. This result is not in support of the findings of Olufunke and Blessings (2014) which showed no significant effect of treatment in the pre-test and post-test scores of the male and female students when taught with the MLA. However, female students in peer-assessment teaching strategies group significantly performed better than their male counterparts. This finding is a contradiction to the finding of Taylor and Wong (1996) on the topic 'Gender differences on the impact of peer influence and peer orientation on African-American adolescents' school value and academic achievement'. They found gender differences in the relationship between academic value, and grade point average in favour of males. In addition, there was a significant gender difference, such that boys' grades are more strongly affected by peer orientation than girls. The reason for this difference in the result was possible because the female students during the intervention were more disciplined and committed than the males. This also suggests that the mastery learning and peer-assessment teaching strategies effectively improved the achievement in Mathematics of the students but discriminated based on gender.

Also, it was revealed from the study that there is no significant effect of mastery learning and peer-assessment of teaching strategies on Senior High School students' achievement in Mathematics based on age. The current finding showed that age does not affect students' achievement in mathematics and therefore does not

support finding of Nam (2014) that age is a factor in determining the academic achievement of students and it does so only at the early stages. It also negates the finding of Black, Devereux and Salvanes (2011) that age differences in academic achievement only exist at the old age (high school) stage.

Conclusion

The researcher concluded that mastery learning and peer assessment teaching strategies are effective methods of teaching and better than the conventional teaching method. Again, it was concluded that facilitating instructional strategies, especially the mastery learning strategy is the better avenue to increasing achievement in mathematics.

Recommendations

1. It was recommended that training should be given to mathematics teachers on how to effectively use both teaching strategies in the mathematics classroom if better performance is desired.

2. It was recommended that mathematics teachers should be encouraged to adopt the two teaching methods to enhance the cognitive learning outcome of students.

3. Again, in the implementation of both teaching strategies, the teachers must pay attention to both male and female students in terms of their understanding during instruction.

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