



Effects of Peer Assessment Strategy on Students' Attitude and Achievement in Mathematics in Senior Secondary Schools in Jos Metropolis, Nigeria.

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ABSTRACT

The study focused on effects of peer assessment strategy on students' attitude and achievement in Mathematics in senior secondary schools in Jos, Plateau State, Nigeria. The study was guided by four objectives and four Research Questions. The study adopted the non-equivalent control group quasi-experimental research design. The target population of this study was 2,786 SSS 1 students. 120 students were used as sample for the study. Simple random sampling technique was used in selecting the sample for the study. The data were collected using Mathematic Achievement Test (MAT) and Mathematics Attitude Scale Questionnaire (MASQ). The validity of the two instruments was established using two experts, one from mathematics unit of the Department of science and technology education and one from Research, measurement and evaluation of the Department of Educational Foundations all of the university of Jos. Reliability coefficients of 0.93 and 0.85 were obtained for the (MAT) and (MASQ) respectively. The data collected were analysed using descriptive and inferential statistics. The research questions were answered using mean and standard deviation while the hypotheses were tested using Analysis of Covariance (ANCOVA) at 0.05 level of significance. The findings showed that, peer assessment strategy had significant effect on the attitude and achievement of students in Mathematics. A significant difference exists in the achievement mean scores of students exposed to peer assessment strategy and those not exposed to it. Significant difference also exists in the attitude mean scores of students exposed to peer assessment strategy and those not exposed to it. It was recommended among others that peer assessment strategy should be incorporated into the teaching and learning of mathematics at the senior secondary school level since it stimulates students to effectively learn and retain the concepts presented to them.

INTRODUCTION

Mathematics as a core subject in the Nigerian educational system is offered by all students up to tertiary levels of education among science and technology subjects/courses (Santrock & Bashir (2022)). The compulsory nature of Mathematics carries with it an assumption that all members of the society should have knowledge of the subject. In the contemporary Nigeria, subsequent to the nation's endorsement of international protocols for Education for All (EFA); the Millennium Development Goals (MDGs) and the adoption of a National Economic Empowerment and Development Strategies (NEEDS). Adejo (2012) assert that greater emphasis is now being placed on industrial and technological development. Consequently, students are being encouraged to take up science and technology related disciplines like Mathematics.

Mathematics is a pillar of almost all the streams in academic sectors. It forms the backbone of various scientific disciplines, serving as the language of physics, chemistry, engineering, and more (Adeyemi, 2012). It provides the necessary framework for understanding and advancing theories in these domains. Mathematics embodies both a conceptual framework for understanding the universe and a practical tool for solving problems and advancing knowledge (Iqbal 2019). Its significance lies not only in its applications across various disciplines but also in its capacity to stimulate curiosity, foster critical thinking, and reveal the inherent beauty and order in the world around us. Given the important role mathematics plays in education sectors and most careers, it is not only beneficial but also essential to establish the teaching strategy that facilitates achievement in mathematics (Hart 2013).

Achievement in mathematics is directly related to knowledge acquired in the cause of instruction. Learners must gain knowledge during teaching /learning process for them to achieve maximally in mathematics (Alade & Moyosore, 2014). Achievement in mathematics varies from one student to another. It however has no regard for gender (Iyang2011). Despite the importance and emphasis placed on Mathematics learning, the rapid decline in the performance of students in Mathematics at the secondary school and in the number of applicants wishing to study Mathematics or pursue science-related courses at tertiary level of education in Nigeria is highly disturbing. According to the WAEC chief examiner's report and NECO chief examiner's report from 2022-2023, revealed that students have a negative attitude towards learning of mathematics which is responsible for the massive failure in the subject, The statistics revealed that 53% failure in 2020, 57% in 2021, and 48% failure in 2022. This trend has caught the attention of government, school administrators, and planners over the consistent failure and frightful performance of students yearly in examinations such as West African Senior Secondary School Certificate Examination (WASSCE), National

Examination Council (NECO) and National Business & Technical Examination Board (NABTEB).

This poor attitude of students as well as the performance of students in mathematics is further worsened by gender imbalance leading to the problem which now constitutes a major research focus across the globe (Adejo 2011 & Furo, 2015). It has also been noticed that assessment and mode of assessment in some of the secondary schools in Nigeria seem to be teacher centered approaches which might not give the students the opportunity to be creative and independent in solving mathematical problems and assess one another in terms of their strengths and weaknesses (Alegre, Moliner, Maroto & Valentine, 2019). Teacher-centered approach may appear to have contributed to poor results in public examinations such as the West African Examination Council (WAEC) and the National Examination Council (NECO) because some of the students hardly see each other's marked work which would have helped them to learn from and support each other in Mathematics (Campbel (2016))

The need for improved achievement in Mathematics has driven teachers and researchers to seek appropriate instructional and assessment strategies. These strategies are those that actively involve students and provide students with the opportunity to use the feedback to improve learning as well allow students to develop the required attitude towards Mathematics (Cambel, 2016). Traditionally, students are seen as passive receivers of information in the classroom who are expected to provide samples of their knowledge in teacher-made tests. Teachers act as personnel who give out instructions and evaluate students' success. From the poststructuralist point of view, Klein and Koroghlanian (2014) notes that "marking with tick and cross" as one of the discursive practices in Mathematics learning may limit students' thinking when answering questions. More recently however, alternative ways of assessment are being tried and one of such is "Peer-Assessment Strategy" which is regarded as the need for pupils to be able to assess themselves and understand how to improve.

Peer-Assessment Strategy according to Dk, Umar, Shagrill and Sajali (2018) is the process whereby students grade assignments or tests, of their mates or peers based on a teacher's benchmarks are assess. Peer Assessment is used to describe the process undertaken by students to assess the performance/contribution of themselves and their peer group, in relation to a group task (Adejo 2019, & Cobbinah, 2020). It is an assessment method in which students score quantitatively or comment qualitatively on their peers' performance in an educational setting. It differs from traditional assessment mainly in terms of the degree of student involvement and interaction. The peer assessment is more of students centered than the conventional traditional ones. Cobbinah (2018)), see peer assessment as a peer moderated marking of students' work based on sets of success criteria from the

teacher. Peer-Assessment Strategy may help encourage deep learning by students; helps develop clearer assessment criteria, and is a good way to generate timely feed-back (Chili-Yungku 2012). The implication of this is that Peer Assessment Strategy may lead to high achievement in the students' performance in subjects like Mathematics. Peer assessment when used may complement examination-oriented methods and serve to facilitate the development of Mathematical proficiency; allow students to participate actively in each part of the assessment process and provides more opportunities for students to think, explain and to argue on Mathematics and provide more meaningful feedback for students (Anchor & Ukwuru, 2014 & Adediwura, 2012).. The students' grading can be more accurate as a result of Peer-Assessment Strategy. If the students look at how other students grade them, it may help them to have more information on the contents of the subject, which could improve their performance in other tests on the subject. A common challenge in the teaching and learning of Mathematics is that students tend to hide their mistakes or avoid making mistakes by giving up without trying. After experiencing peer assessment, Adediwura (2012) reported that Mathematics students were no longer ashamed of their mistakes but instead regarded identifying mistakes by their peers as an opportunity to learn. Iqbal (2019) further reported that students were more active to ask for help and more confident to express their opinions and that students now felt that peer assessment allows them to understand the importance of helping each other's learning. Through assuming the role of an assessor in peer assessment, students may be more aware of the learning goals, assessment criteria, strategies and evaluation of the tasks. In introducing Peer Assessment, the teacher would ensure that students become aware of the benefits for them because they need to see the value for themselves rather than the gains for their teachers. So it is important to introduce peer assessment to improve learning in Mathematics and to develop new skills and attitude to solve Mathematical problems.

Learning mathematics does not only involve thinking and reasoning alone but it is dependent on the attitudes of the learners towards learning and mathematics. Adejo (2019) stated that attitudes consist of cognitive, affective and behavioral reactions that individuals display towards an object or the surrounding based on their feelings or interest.

The cognitive component of attitude is what the individual thinks or believes about mathematics (Ibrahim 2022). The affective component of attitude is the feeling or emotions of the individual associated with learning mathematics (Adejo 2012, Klein (2014) Klein, & Koroghlanian, 2014). Thus, the affective component is the source driving the engagement of students towards mathematics. The behavioural aspect of attitude is the tendency to respond in a certain way towards learning mathematics (Adeyemi, 2012). The learner's attitude towards mathematics determines the level of engagement, the willingness to learn, the choice of

action and response to challenges, the interest and personal effort without which one can hardly perform. Attitude as a major factor affecting learning processes, may be implicit hence has not attracted enough attention from all stakeholders in education and therefore, it is important to consider the fact that learners can mainly contribute to their learning outcomes as a result of their beliefs and perceptions about the subject matter

The role of students' gender in achievement cannot be over looked. According to Adediwura (2012), Karadag, Agrirtas & Pular, (2018), the issue of gender has remained an important issue and it is very relevant in education because it has been linked to achievement and participation in certain profession.

Few Studies have been carried out on effect of peer assessment on students' attitude and achievement. For example: Double, McGrane, Joshua and Therese (2020), carried out a study on the impact of peer assessment on academic performance: A meta-analysis of control group studies and found that students who participated in peer assessment scored higher on academic tasks compared to students who did not participate in peer assessment. Karadağ, Ağırtaş and Pular (2018), investigated the effects of Peer Education on Attitudes of Secondary School Students towards the Course of Physical Education and Sports. The results of the study showed that the students who participated in peer assessment had significantly higher levels of positive attitudes towards physical education and sports courses compared to the students who did not participate.

Adediwura (2012), examined the effect of Peer and Self-Assessment on Male and Female Students' Self-Efficacy and Self-Autonomy in the Learning of Mathematics. The results of the study indicated that both peer and self-assessment had a positive impact on students' self-efficacy and self-autonomy in the learning of mathematics. The study did not find any significant gender differences in the self-assessment group. Iqbal (2019) investigated the Assessment of Male and Female students Attitude towards Mathematics in selected Public and Private Schools in Eti-Osa, Lagos. The study assessed the mathematics learning attitude of senior secondary students towards mathematics in Eti-osa educational district of Lagos state and found that students' attitude was not affected based on gender. Ibrahim (2022), explored the effects of peer-assessment strategy on students' academic achievement in mathematics in senior secondary schools of Nasarawa Local Government Area, Kano State and found that peer assessment strategy improves the achievement of students more than conventional method. The study concludes that peer assessment can be an effective strategy for improving academic achievement in mathematics among senior secondary school students in Nigeria. Abdelkari and Abuiyada (2016), investigated the Effect of Peer Teaching on Academic Achievement of the Undergraduate Students in Oman. Findings showed that peer assessment improves the mathematics achievement of students' more than conventional

method. This suggests that peer teaching can be an effective teaching method for improving academic achievement in mathematics among undergraduate students. The foregoing shows that no study has been carried out on effect of peer assessment strategy on secondary school students' attitude and achievement in mathematics and thence the need for a study to fill the gap. This study therefore seeks to examine the effects of peer assessment strategy on senior secondary students' attitude and achievement in mathematics in Jos metropolis, Plateau state.

Specifically, the study sets out to achieve the following objectives:

1. To examine the pretest and posttest mathematics achievement mean scores of students between the experimental and control group in Jos north L.G.A of Plateau State.
2. To determine the pretest and posttest mathematics attitude mean scores of senior SS1 students between the experimental and control group in Jos north L.G.A of Plateau State.
3. To determine the posttest mathematics achievement mean scores of students based on gender.
4. To examine the posttest mathematics attitude mean scores of male and female students in Jos north L.G.A of Plateau State.

The following research questions guided the study:

1. What is the difference between the Mathematics achievement mean scores of senior secondary school students exposed to Peer Assessment Strategy and those not exposed to it in Jos Metropolis, Plateau State?
2. What is the difference between the attitude mean scores of senior secondary school students exposed to Peer Assessment Strategy and those not exposed to it in Jos Metropolis, Plateau State?
3. What is the difference between the Mathematics achievement mean scores of male and female senior secondary school students exposed to Peer Assessment Strategy in Jos Metropolis, Plateau State?
4. What is the difference between the attitude mean scores of male and female senior secondary school students exposed to Peer Assessment Strategy in Jos Metropolis, Plateau State?

The following null hypotheses are formulated and at 0.05 level of significance:

1. There is no significant difference between the achievement mean scores of students exposed to Peer Assessment Strategy and those not exposed to it.

2. There is no significant difference between the attitude mean scores of students exposed to Peer Assessment Strategy and those not exposed to it.
3. There is no significant difference between the achievement mean scores of male and female students exposed to Peer Assessment Strategy.
4. There is no significant difference between the attitude mean scores of male and female students exposed to Peer Assessment Strategy.

METHOD

This study adopted the Non-equivalent control group quasi-experimental design. Quasi-experimental design like a true experiment, aims to establish a cause-and-effect relationship between an independent and dependent variable. However, unlike a true experiment, it does not rely on random assignment. Instead, subjects are assigned to groups based on non-random criteria.

A simple random sampling technique was used to select the two schools from the 22 (twenty-two) public secondary schools in Jos Metropolis, Plateau state. This sampling method was used because it gives equal chance to all the elements.

One intact class in each school was used for experimental group having 59 students (28 male and 31 female students) and another intact class in a different school for control group having 61 students (29 male and 32 female students). Public secondary schools in Jos Metropolis were used. This is because they tend to have more harmonized program which is uniformly coordinated.

The research instruments that were used for this study were the Mathematics Achievement Test (MAT) and Mathematics attitude scale questionnaire (MASQ).

To ensure that the MAT and MASQ instruments for this study are valid, the contents were subjected to scrutiny.

To ensure the stability of the test instrument (MAT) and attitude scale (MASQ), the two instruments were trial tested and were found to be reliable. Reliability coefficients of 0.93 and 0.85 were obtained for the MAT and MASQ respectively using the Pearson's correlation coefficient.

Mean and standard deviation was used to answer the research question while ANCOVA was used to test the hypotheses at 0.05 level of significance.

RESULTS

Research Question One

What is the difference between the Mathematics achievement mean scores of senior secondary school students exposed to Peer Assessment Strategy and those not exposed to it in Jos Metropolis secondary school, Plateau State?

Table 1: Mathematics Achievement Mean Scores of the experimental and control groups

Group	N	Pre-test		Post-test		Mean Gain	\bar{x} - difference
		Mean	SD	Mean	SD		
Experimental	59	41.46	9.04	73.88	12.69	32.42	21.88
Control	61	30.87	8.08	41.41	8.90	10.54	

Table 1- reveals the pre-test and post-test achievement mean score of students in the experimental and control groups. From the result, students who were exposed to peer assessment had a post-test mean score ($\bar{x} = 73.88$) higher than the pre-test mean score ($\bar{x}=41.46$) with a mean gain of 32.42, indicating that there was improvement in the achievement of students after treatment. Also, for the students who were not exposed to peer' assessment, the mean score was 30.87 and a standard deviation of 8.08 at the pre-test. However, in the post-test the mean score of students rose to 41.41 with a standard deviation of 8.90. The results showed that students in the experimental group had a higher mean score of (73.88) after treatment using peer

assessment than those in the control group (41.41) who were not given treatment with a mean difference of 21.88. This implies that peer assessment improves mathematics students' achievement more than conventional method.

Research Question Two

What is the difference between the attitude rating mean scores of senior secondary school students exposed to peer assessment strategy and those not exposed to it in Jos Metropolis, Plateau state?

Table 2: Mean Attitude ratings of students in the experimental and control group

Group	N	Pre-test		Post-test		Mean Gain	\bar{x} - difference
		Mean	SD	Mean	SD		
Experimental	59	26.41	10.35	59.39	10.76	32.98	28.31
Control	61	24.64	5.72	29.31	10.81	4.67	

Table 2 - reveals the pre-test and post-test attitude mean scores of students in the experimental and control groups. From the result, students who were exposed to peer assessment had a post-test attitude mean score ($\bar{X} = 59.39$) higher than the pre-test mean score ($\bar{X}=26.41$) with a mean gain of 32.98, indicating that there was an improvement in the attitude mean scores of students towards Mathematics after treatment. Also, for the students who were not exposed to peer' assessment, their mean score was 24.61 and a standard deviation of 5.72 at the pre-test. However, in the posttest the mean score of students rose to 29.31 with a standard deviation of 10.81. This indicates that students in experimental group had a higher attitude mean score

(59.39) after treatment using peer assessment technique than those in the control group (32.98) who were not given treatment with a mean difference of 28.31. The result indicates a mean difference between the experimental and control group of 28.31 in favour of the experimental group. This implies that peer assessment improves the achievement of students in mathematics more than conventional method.

Research Question Three

What is the difference between the mathematics achievement mean scores of male and female senior secondary school students exposed to peer assessment in Jos Metropolis secondary school, Plateau state?

Table 3: Post- Test Achievement Mean Score of Male and Female Students exposed to Peer Assessment

Group	Gender	N	Mean	Standard Deviation	Mean difference
	Male	28	74.75	10.87	1.65
	Female	31	73.10	14.27	

Table 3- shows the result of post-test achievement mean scores of male and female students in the experimental group in Mathematics. The mean scores for male yielded ($\bar{X} = 74.75$) and female ($\bar{X} = 73.10$) with a mean difference of 1.65. This implies that female students performed better than male students.

Research Question Four

What is the difference between the mathematics attitude rating mean scores of male and female senior secondary school students exposed to peer assessment strategy in Jos Metropolis secondary school, Plateau State?

Table 4: Post- Test Mathematics Attitude Mean Score of Male and Female Students exposed to Peer Assessment

Group	Gender	N	Mean	Standard Deviation	Mean difference
	Male	28	58.29	12.89	2.1
	Female	31	60.39	8.49	

Table 4 - shows the result of post-test attitude mean scores of male and female students in the experimental group in Mathematics. The mean scores for male yielded ($\bar{X} = 58.29$) and female ($\bar{X} = 60.39$) with a mean difference of 2.1. This implies that female students developed positive attitude towards mathematics than males after exposing the two groups to the same treatment.

Hypothesis One:

There is no significant difference between the mathematics achievements mean scores of senior secondary school students exposed to peer assessment strategy and those not exposed to it.

Table 5: ANCOVA Result on Post-test Achievement Mean Scores of Students in the experimental and control group

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Squared	Eta
Corrected Model	29736.950 ^a	2	14868.475	108.881	.000	.650	
Intercept	17047.005	1	17047.005	124.834	.000	.516	
Pre-test	252.275	1	252.275	1.847	.177	.016	
Group	19529.937	1	19529.937	143.017	.000	.550	
Error	15977.175	117	136.557				
Total	440741.000	120					
Corrected Total	45714.125	119					

a. R Squared = .650 (Adjusted R Squared = .645)

Analysis of Covariance (ANCOVA) results for this hypothesis are presented in Table 5. The results show statistical significance between the adjusted mean scores in posttest achievement ($p < 0.05$). The results further show that 64.5 percent of the variation in the dependent variable which is achievement is explained by variation in the treatment, while the remaining 35.5% is due to other factors not included in this study. It is therefore, concluded from Table 5 that there is a significant mean difference between the achievement of

students in the experimental and those in the control group.

Hypothesis Two:

There is no significant difference between the mathematics attitude rating mean scores of students exposed to peer assessment strategy and those not exposed to it.

Table 6: ANCOVA Result on Post-test Attitude Mean Scores of Students in the experimental and control group

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Squared	Eta
Corrected Model	26311.467 ^a	2	13155.734	105.793	.000	.644	
Intercept	17356.166	1	17356.166	139.571	.000	.544	
Pre-test	321.834	1	321.834	2.588	.110	.022	
Group	25120.665	1	25120.665	202.010	.000	.633	
Error	14549.333	117	124.353				
Total	274238.000	120					
Corrected Total	40860.800	119					

a. R Squared = .644 (Adjusted R Squared = .638)

The Analysis of Covariance (ANCOVA) results for this hypothesis are presented in Table 6. The results show statistical significance between the adjusted mean scores in posttest achievement ($p < 0.05$), since the p -value of 0.000 is less than 0.05 level of significance, the null hypothesis was rejected, indicating that there was a significant effect of peer assessment on students' attitude towards Mathematics. The result further reveals an adjusted R squared value of .638 which means that 63.8 percent of the variation in the dependent variable which is attitude is explained by variation in the

treatment, while the remaining 36.2% is due to other factors not included in this study. Hence, we can say that peer assessment can help change students' attitude towards Mathematics.

Hypothesis Three:

There is no significant difference between the achievement mean scores of male and female students exposed to peer assessment strategy.

Table 7: ANCOVA Result on Achievement of Experimental Group in Mathematics based on Gender

Source	Type III Sum of Squares	Df	Mean Square	F	P-value	Partial Squared	Eta
Corrected Model	198.137 ^a	2	99.069	.607	.549	.021	
Intercept	17422.243	1	17422.243	106.744	.000	.656	
Pre-test	157.927	1	157.927	.968	.330	.017	
Gender	28.417	1	28.417	.174	.678	.003	
Error	9140.032	56	163.215				
Total	331387.000	59					
Corrected Total	9338.169	58					

a. R Squared = .021 (Adjusted R Squared =-.014)

The Analysis of Covariance (ANCOVA) results for this hypothesis are presented in Table 7. The results show no statistical significance between the adjusted mean scores in posttest achievement ($p > 0.05$). The main effect of male yielded ($\bar{X} = 74.75$; $SD = 10.87$) and female ($\bar{X} = 73.10$; $SD = 14.27$); $F(1, 56) = .174$, $P > 0.05$, since the p -value of .678 is greater than the 0.05 level of significance, the null hypothesis was retained. This indicates that the achievement of male students in

Mathematics do not significantly differ from those of female students. It means that students' achievement in Mathematics is not affected by gender.

Hypothesis Four:

There is no significant difference between the attitude rating mean scores of male and female students exposed to peer assessment strategy.

Table 8: ANCOVA Result on Attitude mean rating of Experimental Group in Mathematics based on Gender

Source	Type III Sum of Squares	Df	Mean Square	F	P-value	Partial Squared	Eta
Corrected Model	111.989 ^a	2	55.994	.475	.625	.017	
Intercept	29354.036	1	29354.036	248.837	.000	.816	
Pre-test	47.024	1	47.024	.399	.530	.007	
Gender	72.674	1	72.674	.616	.436	.011	
Error	6606.045	56	117.965				
Total	214820.000	59					
Corrected Total	6718.034	58					

a. R Squared = .017 (Adjusted R Squared =-.018)

The Analysis of Covariance (ANCOVA) results for this hypothesis are presented in Table 8. The results show no statistical significance between the adjusted mean scores in posttest achievement ($p > 0.05$). The data were subjected to analysis of covariance (ANCOVA) having male and female students exposed to peer' assessment. The main effect of male yielded ($\bar{X} = 58.29$; $SD = 12.89$) and female ($\bar{X} = 60.39$; $SD = 8.49$); $F(1, 56) = .616$, $P > 0.05$, since the p -value of .436 is greater than the 0.05 level of significance, the null hypothesis was retained. This indicates that the attitude of male students towards Mathematics do not

significantly differ from those of female students. It means that students' attitude towards Mathematics is not affected by gender.

DISCUSSION OF FINDINGS

Findings from research question one revealed that students that were exposed to peer assessment strategy improved better than those that were not exposed to it in Mathematics Achievement Test. The result of hypothesis one showed that there is a significant

difference between the Mathematics achievement mean scores of senior secondary school students exposed to Peer-Assessment Strategy and those not exposed to it in Jos metropolis, Plateau state, Nigeria. This finding is in agreement with the findings by Double, McGrane, Joshua, Hopfenbeck and Therese (2020), who found that students that were exposed to peer assessment achieve higher than those that were not exposed to it. The implication of this is that peer-assessment is effective and efficient in ensuring the development of the desired knowledge, skill and capabilities required in students.

Findings from research question two revealed that students who were exposed to peer assessment strategy had higher levels of positive attitudes towards mathematics than those that were not exposed to it. The result of hypothesis two revealed that there is a significant difference between the attitude rating mean scores of senior secondary school students exposed to Peer-Assessment Strategy and those not exposed to it in Jos metropolis, Plateau state, Nigeria. This finding is in agreement with the findings by Karadag, Agirtas and Pular (2018) who found that students who were exposed to peer' assessment had higher levels of positive attitudes towards physical education and sport courses than those that were not exposed to it.

This showed that students introduced to peer assessment will not only excel in their academic achievements but also develop a positive attitude towards that subject.

Findings from research question three revealed that there was no difference in achievement between male and female students that were exposed to peer assessment strategy. The result of hypothesis three also showed that there is no significant gender difference between the Mathematics achievements mean scores of male and female senior secondary school students exposed to Peer-Assessment Strategy in Jos metropolis, Plateau state, Nigeria. This finding is in agreement with the findings by Adediwura (2012), who found no gender difference in the implementation of peer assessment programs of both male and female students exposed to peer assessment strategy.

The implication is that peer assessment had no gender bias in terms of improving students' academic achievement.

Findings from research question four revealed that there was no difference in attitude between male and female students that were exposed to peer assessment strategy. The result of hypothesis four concluded that there is no significant gender difference between the attitude rating mean scores of senior secondary school students exposed to Peer-Assessment Strategy in Jos metropolis, Plateau state, Nigeria. This finding is in agreement with the findings by Iqbal (2019) who revealed that there were no significant differences in the learning attitudes of private and public senior secondary school students and male and female senior secondary school students towards the learning of mathematics in Eti-osa educational district of Lagos State. The

implication of this finding is that both genders should be given equal opportunity to do their best.

CONCLUSION

Peer assessment strategy has been found to have a positive impact on both students' attitudes and achievement in this study.

In terms of student's attitudes, peer assessment has been shown to improve students' self-regulation, self-reflection, and self-evaluation skills. This is because peer assessment requires students to evaluate their own work and the work of others, which can help them develop a deeper understanding of the assessment criteria and their own learning. Additionally, peer assessment can improve students' motivation and engagement in learning, as it provides them with opportunities to receive feedback from their peers and to collaborate with them.

Regarding student achievement, peer assessment has been found to have a positive effect on learning outcomes. This study has shown that students who engage in peer assessment tend to achieve higher grades than those who do not. This is because peer assessment provides students with more opportunities to practice and apply their knowledge and skills, and it allows them to receive feedback on their work from multiple sources, which can help them identify areas for improvement.

Despite some challenges, this study suggests that peer assessment can be a valuable tool for promoting positive student attitudes and improving learning outcomes.

RECOMMENDATIONS

In the light of the findings from this study, the following recommendations were made:

1. Teachers should incorporate peer assessment strategy into their teaching and learning of mathematics so as to improve students' performance.
2. Schools should provide professional development opportunities for teachers to learn about peer assessment and how to effectively incorporate it into their teaching practices.
3. Further research should be conducted to explore the long-term effects of peer assessment on students' attitude and achievement in mathematics'
4. Teachers should provide clear guidelines and criteria for peer assessment to ensure its effectiveness and fairness.
5. Students should be given opportunities to reflect on their own work and the work of their peers during peer assessment to enhance their learning and self-awareness.

6. Peer assessment can be extended beyond the classroom to promote social and emotional learning, which can have a positive impact on students' overall development.

REFERENCES

- Abdelkari, O. R. & Abuiyada¹, R. (2016)., The Effect of Peer Teaching on Mathematics Academic Achievement of the Undergraduate Students in 1 College of Arts and Applied Science, Dhofar University, Salalah: Ra'ed Abdelkarim, College of Arts and Applied Science, Mathematics and Sciences Unit, Dhofar University, Salalah, *International Education Studies*; 9(5), ISSN 1913-9020 E-ISSN 1913-9039 Published by Canadian Center of Science and Education.
- Achor, E. E., & Ukwuru, J.O. (2014). An examination of the facilitative peer assessment on students' achievement in chemical reaction and equilibrium. *Journal of Education*, 4(1),7–11.
- Adediwura, A. A. (2012). Effect of Peer and Self-Assessment on Male and Female Students' Self-Efficacy and Self-Autonomy in the Learning of Mathematics, *10(1)*, 13 – 17.
- Adejo, A. (2011). Enhancing effective performance of female students. A case study of Federal College of Education, Pankshin.
- Adejo, H. F. (2012). Analysis of gender discriminatory terms and illustrations in commonly used science textbook University of Ado Ekiti. Unpublished M.Ed research project University of Ado Ekiti.
- Adejo, H. F. (2019). Analysis of gender discriminatory terms and illustrations in commonly used science textbook university of Ado Ekiti. *Unpublished M.Ed research project University of Ado Ekiti*.
- Adeyemi, T.O. (2012) predicting students' performance in Junior Secondary Certificate Examination in Ondo State Nigeria. *Journal Humanity and Social Sciences* 3 (1): 26-36.
- Alade, O. M. & Moyosore, O. A. (2014). The effect of peer - assessment strategy on students' achievement in senior secondary school economics. Department of Educational Foundations, University of Lagos, Akoka. *International Journal of Education and Research*, 2 (11), November, ISSN: 2201-6333 (Print) ISSN: 2201-6740 (Online) www.ijern.com
- Alegre, F, Moliner, L, Maroto, A & Valentin, G. (2019). Peer tutoring and mathematics in secondary educational: literature review, effect sizes, moderators, and implications for practice. *Journal homepage: www.heliyon.com*
- Bashir M. I (2022) Vol 2, Issue 10 (October, 2022) Effect of Peer-Assessment strategy on student Academic Achievement in Mathematic in Senior Secondary Schools in Nasarawa Local Government Area, Kano State Nigeria *International Journal of research in Education and Sustainable Development /ISSN: 2782-76* www.ijaar.org/ijresd
- Campbel, M. A. (2016). Effects of the 5E Learning Cycle Model on Students' Understanding of Force and Motion Concept. Unpublished M.Ed. Thesis, University of Central Florida, Orlando, Florida.
- Chili-Yungku, (2012). Effects of peer assessment and web-based instruction on the mathematics curriculum. A case study of the elementary school graphic geometry units – master degree thesis.
- Cobbinah, A. (2020). Effect of peer assessment skills on Ghanaian senior high school students' achievement in mathematics. Department of education and psychology, University of Cape Coast, Ghana.aAndycobbina30@yahoo.com, andrews.cob bin ahucc.edu.gh
- Dk, S., Omar, N. B., Shahrill, M., & Sajali, M. (2018). The Use of Peer Assessment to Improve Students' Learning of Geometry August 2018 *European Journal of Social Sciences Education and Research* 5(2):187-206, DOI:10.2478/ejser-2018-0047
- Double, K. S., McGrane, J. A., & Hopfenbeck, T. N. (2020). The impact of peer assessment on academic performance: A meta-analysis of control group studies. *Educational Psychology Review*, 32(2), 481–s 509. <https://doi.org/10.1007/s10648-019-09510-3>.
- Furo, P. T. (2015). Peer assessment and students' interest and determinant of SS II chemistry students' achievement in chemical equilibrium in Rivers State. *International Organization of Science and Research-Journal of Applied Chemistry (IOSR-JAC)*, 8(8) 50 -56.
- Hart, W. J. (2013). Peer assessment of spatial visualization performance. A thesis submitted to the graduate Faculty of North Carolina State University in partial fulfillment of the requirements for the degree of masters in science. Retrieved 09/03/2016.
- Ibrahim, B. M. (2022). Effects of peer-assessment strategy on students' academic achievement in mathematics in senior secondary schools of Nasarawa local Government Area, Kano State, Nigeria, Department of Educational Psychology

and Counselling Faculty of Education Ahmadu Bello University, Zaria. *International Journal of Research in Education and Sustainable Development*, 2(10), www.ijaar.org/ijresd

- Inyang, N.O. (2011). Influence of ability and gender grouping on senior secondary school chemistry students' achievement on concepts of redox reactions. *Journal of Science Teachers Association of Nigeria (STAN)* 35(1&2), 36-4.
- Iqbal, K. (2019). Peer assessment, school improvement research series. Retrieved on 9/12/2017 from <http://www.nwrel.org/scpd/sirs/5/cu10.html>.
- Karadağ, M. , Ağirtaş1, R. , Pular1, A. & Firat, I. (2018). Effects of Peer Education on Attitudes of Secondary School Students Towards the Course of Physical Education and Sports University Faculty of Sports Science1 Gazi University Faculty of Sports Science, Turkey . *Journal of Education and Training Studies*, 6 (4a), April 2018 ISSN 2324-805X E-ISSN 2324-8068 Published by Redfame Publishing URL: <http://jets.redfame.com> Sports Science Faculty, Fırat University, Turkey. Received: April 9, 2018 Accepted: May 8, 2018 OnliSne Published: May 25, 2018
- Klein, D. (2014). Conditions influencing the effectiveness of peer assessment/ animation and non-animated display in computer assisted instruction. Unpublished doctoral dissertation. University of Illinois in Urbana-Champaign.
- Klein, J., & Koroghlanian, C. (2014). The effect of peer assessment in multimedia instruction, *Journal of Educational Multimedia and Hypermedia*, 13(1), 23 – 46.
- Santrock, O. (2015). Travelling through education. Uncertainty, mathematics, responsibility. Rotterdam: Sense Publishers.

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