Drill-and-Practice, Peer-Tutoring Instructional Strategies and Students' Academic Performance in Mathematics in Ikono Local Government Area

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DOI: https://doi.org/10.47772/IJRISS.2026.100600016

Received: 21 May 2026; Accepted: 26 May 2026; Published: 16 June 2026

ABSTRACT

This study examined the effects of drill-and-practice, peer-tutoring, and conventional expository instruction on junior secondary school students' academic performance in algebra. A quasi-experimental pre-test post-test design was employed with 259 students from six public schools in Ikono Local Government Area, Akwa Ibom State, Nigeria. The three instructional groups (drill-and-practice, peer-tutoring, and expository) were taught the same algebra content over six weeks. The Mathematics Performance Test in Algebra (MPTA), a 20-item multiple-choice instrument (KR-20 = 0.78), served as the pre-test and post-test. Analysis of covariance (ANCOVA), with pre-test scores as the covariate, revealed a statistically significant main effect of instructional method, $F(2, 255) = 573.45$, $p < .001$, partial $\eta^2 = 0.818$. Pairwise comparisons showed that peer-tutoring produced the highest adjusted post-test scores, followed by drill-and-practice, while the conventional method yielded the lowest scores. Importantly, no significant gender differences were found within either the peer-tutoring or drill-and-practice groups, indicating that both strategies are equally effective for male and female students. The study concludes that peer-tutoring is the most powerful instructional strategy for enhancing algebraic achievement, and both innovative strategies outperform conventional teaching. Recommendations include the systematic adoption of peer-tutoring and drill-and-practice in mathematics classrooms, supported by teacher training and curriculum revision.

Keywords: Drill-and-Practice, Peer-Tutoring, Instructional Strategies, Academic Performance, Gender

INTRODUCTION

Mathematics is a vital subject for teachers, students and society at large. Individual intellectual qualities such as reasoning, thinking, induction, interpretation, originality, creativity, and discovery are all developed through mathematics (Iroko & Olaoye, 2021). Mathematics is a body of knowledge that is needed for a scientific and technological nation to succeed. According to Ale and Adetula (2015), the line dividing industrialized and developing countries is drawn based on their mathematical attainment and creativity. Mathematics education is one of the subjects that have been identified as a major factor in progress and prompting a national emphasis on the topic (Ogena, 2015). Any nation's economic and technological growth is built on the basis of mathematics. It is believed that without mathematics, no modern technology can exist, which is why mathematics is made a compulsory subject in Nigerian primary and secondary schools (FRN, 2014). Thus, mathematics is supposed to aid in the acceleration of every society's social, economic, and technical growth. The themes of the current Mathematics curriculum for senior secondary school are based on five pronged approach as follows: Number and numeration, Algebraic processes, Geometry, Statistics and Introductory calculus (NERDC, 2017). Among the themes mentioned, algebraic processes serve as a connecting bridge that connects other themes of mathematics.

Algebra is a subset of mathematics that uses letters rather than numbers to solve problems. Algebra, as a key to mathematics, is one of the concepts in which students fail the most (Usman & Musa, 2019). Students' weak Algebra performance can be traced back to mistakes made by students when attempting to solve algebraic problems, which can be formal, logical, or both. The mystery of computational skills and knowledge of

procedures for identifying mathematical components, algorithms, and definitions are linked to procedural knowledge, while conceptual errors are linked to conceptual knowledge, which refers to knowledge of the underlying structure of mathematics, the relationships and interconnections of ideas that explain a problem (Eisenhart, Borko, Underhill, Brown, Jones, & Agard, 2013). Despite the importance and relevance of mathematics to the students' academic progress, many problems still attach to it which has resulted to unstable performance in Senior Secondary Certificate Examinations.

Analysis of students' performance in Mathematics (Federal Republic of Nigeria, 2018; Nkwo & Abasi, 2023) shows that the performance of Nigerian students is not encouraging. Nigerian students according to Achor, Imoko & Uloko, (2019) now take the last position instead of first in Senior School Certificate Examination (SSCE) Mathematics among the English-speaking West African countries. This is an indication of their low mastery of the subject. Consequently, many researchers have attributed this low performance to a number of factors including poor teaching methods adopted by teachers (Jepketer, 2017; Jolif, 2018; Nghambi, 2014). Proof flourish that numerous non-proficient and in-experienced teachers present topics in mathematics to the students in manners that the students find it hard to understand some math ideas (Iji, 2018; Onose, 2017). Numerous teachers stick to conventional strategies in which replies to the earlier day's home works are first given, then instructor- coordinated explanations are utilized to introduce materials for the new example (Odili, 2016). The capacity to basically comprehend and hold data is subsequently not created in the students. In the light of the above, the researcher sought to test the efficiency of two innovative and student-centered method of teaching, viz Drill-and Practice and Peer-tutoring instructional strategy in enhancing students' academic performance in Mathematics.

Drill-and-practice is an instructional strategy that entails acquisition of knowledge or skill through systematic training by multiple repetitions, rehearsal and practice that involves repetition of specific skills (Mudasiru & Adedeji, 2015). Drill-and-practice can be described as a student-centered strategy that enhances integrated understanding and foster long term retention (Mohan, 2017). The strategy involves the repetition of routine exercises, tasks and words to guarantee flawless performance. Mohan et al. (2018) in their research noted that drill-practice is necessary to facilitate the learning of new content and assess previously learned content. Teachers and students are in touch with learning tasks, engage in creative information sharing, announce upcoming events, share contents of homework, note-taking, remind themselves of to-do-list, capture feedbacks, scores and upload activities for further studies. Drill-and-practice is used as a mean of teaching and perfecting skill or procedure (Mudasiru & Adedeji, 2015). This present study sought to observe the difference in students' academic performance in Mathematics taught using Drill-and-Practice and those taught using peer-tutoring instructional strategy.

On the other hand, peer-tutoring is an instructional strategy of students' partnership, linking high performing students with lower achieving students for structured reading, discussion, and information exchange among students, during science lesson (Ezenwosu, 2013). According to Baleni, Malatji and Wadesango (2016), peer tutoring instructional strategy is an effective educational classroom of diverse learners because it promotes academic gains and social enhancement and can be successfully implemented at the classroom-level or on a wider scale at school. It is an instructional strategy that consists of pairing students together to learn and practice an academic task. Peer tutoring can also be regarded as the process between two or more students in a group where one of the students act as a tutor for the other group mate(s) (Ogundola, 2017). Topping (2017) defined peer tutor as a surrogate teacher in a linear model of the transmission of knowledge from teacher to tutor to tutee. According to Spencer (2015), peer tutoring increases self-confidence and self-efficacy. The teacher serves as a facilitator in using peer tutoring instructional strategy. This study was carried out to access whether this instructional strategy will be efficient in reversing the inconsistencies recorded in Mathematics examinations.

The poor performance of students is further worsened by gender imbalance, which now constitutes a major research focus across the globe (UNESCO, 2013). Gender refers to a socio-cultural construct that connotes the differentiated roles and responsibilities of men and women in a particular society (Mwiigi, 2014). This definition implies that gender determines the role, which one plays in relation to political, cultural, social and economic system of the society. Research has shown gender differences in students' academic performance in science and researchers have come out with contradicting findings on the influence of gender on academic performance of students in science. For instance, Abasi and George (2025b) found that gender had no influence on students'

academic performance in mathematics when taught using game-based instructional approach. Similarly, Edem and Abasi (2025) reported that programmed instruction enhanced students' comprehension of quadratic equations irrespective of gender. Hence, this study also sought to investigate the influence of gender on students' academic performance when taught the concept of algebra in Mathematics using drill-and-practice and peer-tutoring instructional strategies in Ikono Local Government Area.

Statement of the Problem

Many students find it challenging to learn Mathematics, and they often fail to excel. This may be due to the fact that their learning methods do not enable them to establish adequate understanding of fundamental Mathematics concepts. Students' shortcomings in Algebra theme range from word problems leading to simple linear equations, algebraic graph, reading/answering from the graph, interpretation/solution to word problems, translation of word problems into mathematical expressions, inequality, and graphical solutions to quadratic equations, according to reports from the WAEC Chief Examiners (Mathematics) from May/June 2018 to May/June 2021 SSCE. Mathematics result analysis from those periods also shows that students' performance in Mathematics has been fluctuating; it is not stabling increasing or decreasing. The result of this examination is also used as prerequisite for admission into institutions of higher learning where students could go to pursue courses in their areas of interest. Aforementioned issues may not be exclusively due to the method of teaching, but how students are taught has a significant impact on their success. As a result, research into implementing alternative teaching methods is needed in order to provide a solution to this issue. Therefore, this study intended to provide answer to the question: what is the effect of drill-and-practice and peer-tutoring instructional strategies on students' algebra success at the junior secondary school level in Ikono Local Government Area of Akwa Ibom State.

Purpose of the Study

The purpose of the study was to compare the effect of drill-and-practice and peer-tutoring instructional strategies on students' academic performance in Mathematics in Ikono Local Government Area of Akwa Ibom State. Specifically, the study sought to:

1. Determine the difference in the mean performance scores of Mathematics students taught the concept of Algebra using drill-and-practice, peer-tutoring and expository (conventional) instructional strategies.

2. Determine the difference in the mean performance scores of male and female students taught the concept of Algebra using drill-and-practice instructional strategy.

3. Determine the difference in the mean performance scores of male and female students taught the concept of Algebra using peer-tutoring instructional strategy.

Research Questions

The following research questions were posed to guide the study:

1. What is the difference in the mean performance scores of Mathematics students taught the concept of Algebra using drill-and-practice, peer-tutoring and expository (conventional) instructional strategies?

2. What is the difference in the mean performance scores of male and female students taught the concept of Algebra using drill-and-practice instructional strategy?

3. What is the difference in the mean performance scores of male and female students taught the concept of Algebra using peer-tutoring instructional strategy?

Hypotheses

The following null hypotheses were formulated for the study and were tested at 0.05 level of significance:

1. There is no significant difference in the mean performance scores of Mathematics students taught the concept of Algebra using drill-and-practice, peer-tutoring and expository (conventional) instructional strategies.

2. There is no significant difference in the mean performance scores of male and female students taught the concept of Algebra using drill-and-practice instructional strategy.

3. There is no significant difference in the mean performance scores of male and female students taught the concept of Algebra using peer-tutoring instructional strategy.

Theoretical Framework

This study is anchored on two complementary learning theories. Edward Thorndike's Behavioural Connectivism (1913) posits that learning occurs through reinforcement and repetition; frequent practice strengthens the connection between a stimulus and a response. This theory supports the drill-and-practice strategy, where systematic repetition and immediate feedback facilitate skill acquisition and long-term retention. In contrast, Lev Vygotsky's Social Constructivist Theory (1978) emphasises that learning is a social process whereby students co-construct knowledge through interaction with more knowledgeable peers within their Zone of Proximal Development. This framework underpins the peer-tutoring strategy, as it enables students to explain, question, and support each other, thereby deepening understanding. Together, these theories provide a rationale for expecting that both drill-and-practice and peer-tutoring can enhance students' academic performance in algebra, albeit through different mechanisms: the former via reinforcement and the latter via collaborative dialogue.

Methods

Research Design

The study adopted a quasi-experimental pre-test post-test non-equivalent control group design. This design is appropriate when random assignment of individual students to groups is not feasible in school settings. Six intact classes were used, two assigned to one of three instructional conditions: drill-and-practice, peer-tutoring, and conventional (expository) method.

Area of Study

The study was conducted in Ikono Local Government Area (LGA) of Akwa Ibom State, Nigeria. Ikono LGA has 19 public secondary schools and is predominantly rural. The choice of this area was based on the persistently poor performance of students in mathematics in public examinations.

Population of the Study

The target population comprised all Junior Secondary School Two (JS2) students in the 19 public secondary schools of Ikono LGA. According to the Akwa Ibom State Secondary Education Board (2024), the total number of JS2 students was 4,293 at the time of the study.

Sample and Sampling Technique

The sample consisted of 259 JS2 students drawn from six public secondary schools in Ikono LGA. First, six schools were randomly selected from the 19 schools using balloting. These six schools were then randomly assigned to three instructional conditions (two schools per condition): drill-and-practice (84 students), peer-tutoring (95 students), and expository/conventional (80 students). Within each school, one intact JS2 class was used.

Instrument for Data Collection

The instrument was a researcher-developed Mathematics Performance Test in Algebra (MPTA). It consisted of 20 multiple-choice questions with four options (A-D) covering JS2 algebra topics (linear equations, simple

inequalities, word problems, and algebraic expressions). The MPTA was validated for face and content validity by an expert in Test and Measurement in the Department of Science Education, Akwa Ibom State University. The expert reviewed clarity, relevance, and alignment with the scheme of work. A trial test was conducted with 20 JS2 students from a non-participating school. Reliability was established using the Kuder-Richardson formula (KR-20), yielding a coefficient of 0.78, which was considered acceptable for the research.

Instructional Procedures

The intervention lasted six weeks (two 40-minute sessions per week) to allow sufficient time for the strategies to take effect and to reduce novelty effects. Two trained research assistants (qualified mathematics teachers) delivered the instruction in each school following detailed lesson plans. To monitor fidelity, a structured observation checklist was used in 20% of sessions; adherence to the planned strategies was 92% across groups.

Drill-and-practice group: Each session began with a 5-minute teacher demonstration of a solved example. Students then spent 30 minutes working individually on worksheets containing 20–30 similar problems (e.g., solving linear equations, simplifying expressions). Immediate feedback was provided after every five problems, and errors were corrected through repeated practice.

Peer-tutoring group: Students were paired (one higher-achieving tutor with one lower-achieving tutee) based on their pre-test scores. Tutors received a 30-minute training session on how to explain algebraic concepts, ask guiding questions, and provide positive feedback. Each 40-minute session included 10 minutes of paired problem-solving, 20 minutes of guided practice with the tutor, and 10 minutes of whole-class review. The teacher circulated and supported pairs as needed.

Conventional (expository) group: This group received instruction using the typical lecture-based method: the teacher explained algebraic rules and procedures, solved examples on the board, and gave students homework to complete individually. No peer interaction or repetitive drill was structured.

All groups covered the same algebra content, and the same pre-test and post-test (MPTA) were administered to all students.

Data Collection Procedure

Approval was obtained from the principals of the selected schools. The pre-test was administered to all participating students one week before the intervention to measure prior knowledge. After the six-week instructional period, the post-test (identical to the pre-test) was administered under similar conditions. Completed answer sheets were coded and scored (one mark per correct answer, maximum 20).

Data Analysis

Descriptive statistics (mean, standard deviation) were used to answer the research questions. To test the hypotheses, one-way analysis of covariance (ANCOVA) was performed on post-test scores, with pre-test scores as the covariate and instructional method as the fixed factor. For gender comparisons within each method, separate ANCOVAs were run (with pre-test as covariate and gender as fixed factor). Effect sizes (partial η^2) and 95% confidence intervals for adjusted means are reported. Pairwise comparisons among methods used Bonferroni correction. The significance level was set at $\alpha = 0.05$.

RESULTS

The data generated from the retrieved instruments were analysed using mean and standard deviation to answer the research questions and independent t-test statistics to test the hypotheses at 0.05 level of significance.

Answering the Research Questions

Research question one: What is the difference in the mean performance scores of Mathematics students taught the concept of Algebra using drill-and-practice, peer-tutoring and conventional instructional strategies?

Table 1: Mean, standard deviation, and mean gain scores of students taught algebra using drill-and-practice, peer-tutoring, and expository (conventional) instructional strategies

Method	n	Pre-test Mean (SD)	Post-test Mean (SD)	Mean Gain (Post – Pre)
Drill and Practice	84	4.88 (0.70)	11.31 (1.13)	6.43
Peer-Tutoring	95	4.91 (0.72)	14.15 (1.68)	9.24
Expository (Conventional)	80	4.89 (0.72)	7.39 (0.97)	2.50

Table 1 revealed that the post-test mean scores of students taught the concept of algebra using peer-tutoring instructional strategy (mean = 14.15, SD = 1.68) is higher than the post-test mean scores of those taught using drill-and-practice (mean = 11.31, SD = 1.13) and those taught using expository or conventional method (mean = 7.39, SD = 0.97). The post-test mean difference between peer-tutoring and drill-and-practice is 2.84, while the difference between peer-tutoring and conventional method is 6.76, and the difference between drill-and-practice and conventional method is 3.92.

Additionally, the mean gain scores (post-test minus pre-test) show that peer-tutoring produced the highest learning gain (9.24), followed by drill-and-practice (6.43), while the conventional method produced the smallest gain (2.50). Hence, there is a clear distinction in students' performance in mathematics when exposed to the three instructional strategies, with peer-tutoring yielding the highest post-test performance and the largest improvement from pre-test to post-test, followed by drill-and-practice, and the conventional expository method being the least effective.

Research question two: What is the difference in the mean performance scores of male and female students taught the concept of Algebra using drill-and-practice instructional strategy?

Table 2: Mean, standard deviation, and mean gain scores of male and female students taught the concept of algebra using drill-and-practice instructional strategy

Instructional Strategy	Gender	n	Pre-test Mean (SD)	Post-test Mean (SD)	Mean Gain (Post – Pre)
Drill-and-Practice	Male	41	4.88 (0.71)	11.15 (1.09)	6.27
	Female	43	4.88 (0.70)	11.47 (1.16)	6.59

Table 2 revealed that the post-test mean score of female students taught the concept of algebra using drill-and-practice instructional strategy (mean = 11.47, SD = 1.16) is slightly higher than the post-test mean score of their male counterparts (mean = 11.15, SD = 1.09), with a mean difference of 0.32 in favor of female students. However, both male and female students started with almost identical pre-test mean scores (male = 4.88, female = 4.88), indicating that both groups had equivalent prior knowledge of algebra before the instruction began. When examining the mean gain scores (post-test minus pre-test), female students recorded a mean gain of 6.59, while male students recorded a mean gain of 6.27, a difference of only 0.32.

This small difference suggests that both male and female students benefited almost equally from the drill-and-practice instructional strategy. Hence, there is no substantial difference in the performance of male and female students when taught the concept of algebra using drill-and-practice, implying that this instructional strategy is gender-friendly and promotes learning equally for both sexes.

Research question three: What is the difference in the mean performance scores of male and female students taught the concept of Algebra using peer-tutoring instructional strategy?

Table 3: Mean, standard deviation, and mean gain scores of male and female students taught the concept of algebra using peer-tutoring instructional strategy

Instructional Strategy	Gender	n	Pre-test Mean (SD)	Post-test Mean (SD)	Mean Gain (Post – Pre)
Peer-Tutoring	Male	45	4.87 (0.69)	14.18 (1.72)	9.31
	Female	50	4.94 (0.74)	14.12 (1.65)	9.18

Table 3 revealed that the post-test mean scores of male students taught the concept of algebra using peer-tutoring instructional strategy (mean = 14.18, SD = 1.72) is approximately equal to the post-test mean score of their female counterparts (mean = 14.12, SD = 1.65), with a negligible mean difference of 0.06 in favor of male students. Both male and female students had comparable pre-test mean scores (male = 4.87, female = 4.94), indicating that they possessed similar prior knowledge of algebra before the instruction. When examining the mean gain scores (post-test minus pre-test), male students recorded a mean gain of 9.31, while female students recorded a mean gain of 9.18, a difference of only 0.13. This very small difference suggests that both male and female students benefited equally from the peer-tutoring instructional strategy. Hence, there is no meaningful difference in the performance of male and female students when taught the concept of algebra using peer-tutoring, implying that this instructional strategy is also gender-friendly and enhances learning equally for both sexes.

Testing the Hypotheses

Hypothesis one: There is no significant difference in the mean performance scores of Mathematics students taught the concept of Algebra using drill-and-practice, peer-tutoring and expository instructional strategies.

Table 4: One-way ANCOVA summary for students' post-test performance scores in algebra by instructional method, with pre-test scores as covariate

Source	Type III Sum of Squares	df	Mean Square	F	p	Partial η^2
Pre-test (covariate)	2.928	1	2.928	1.689	.195	.007
Method	1987.739	2	993.870	573.453	.000	.818
Error	441.949	255	1.733			

R^2 = .818 (Adjusted R^2 = .816)

Table 4 revealed the results of a one-way analysis of covariance (ANCOVA) conducted to determine whether there is a significant difference in students' post-test performance scores in algebra after controlling for their pre-test scores (covariate). The covariate, pre-test scores, was not significantly related to post-test performance, $F(1, 255) = 1.689$, $p = .195$, partial $\eta^2 = 0.007$, indicating that pre-existing knowledge of algebra did not have a strong effect on the outcome measure after accounting for the instructional methods.

Also, the main effect of instructional method was highly significant, $F(2, 255) = 573.453$, $p < .001$, partial $\eta^2 = 0.818$. This means that after adjusting for pre-test differences, there is a statistically significant difference in the mean post-test scores among the three instructional strategies (drill-and-practice, peer-tutoring, and expository/conventional method). The partial eta squared value of 0.818 indicates an extremely large effect size, meaning that approximately 81.8% of the variance in students' post-test performance scores can be attributed to the instructional method used. This strong effect suggests that the choice of teaching strategy has a profound influence on students' learning outcomes in algebra. Therefore, the null hypothesis of no difference among the three methods is rejected.

Table 5: Adjusted post-test mean scores, standard errors, and pairwise comparisons among instructional methods (Bonferroni correction)

Method	Adjusted Mean	Std. Error	95% Confidence Interval	Comparison	Mean Diff.	p (Bonferroni)	Cohen's d
Drill and Practice	11.31	0.144	[11.03, 11.60]	Drill vs. Peer	–2.834	< .001	1.92
Peer-Tutoring	14.15	0.135	[13.88, 14.41]	Drill vs. Expository	3.925	< .001	3.52
Expository (Conventional)	7.39	0.147	[7.10, 7.68]	Peer vs. Expository	6.759	< .001	4.95

Note: Covariates appearing in the model are evaluated at pre-test mean = 4.8958. Cohen's d computed using pooled SD from ANCOVA error term (√1.733 = 1.316).

Table 5 revealed the estimated marginal means (adjusted post-test means) for each instructional method after controlling for pre-test scores, as well as the pairwise comparisons between the three methods using Bonferroni correction to control for Type I error.

The adjusted mean post-test score for students taught using **peer-tutoring** was 14.15 (SE = 0.135, 95% CI [13.88, 14.41]), which was the highest among the three groups. Students taught using **drill-and-practice** had an adjusted mean of 11.31 (SE = 0.144, 95% CI [11.03, 11.60]), while those taught using the **expository (conventional) method** had the lowest adjusted mean of 7.39 (SE = 0.147, 95% CI [7.10, 7.68]).

The pairwise comparisons revealed that all differences between methods were statistically significant at $p < .001$. Specifically:

1. **Peer-tutoring versus drill-and-practice:** The mean difference was 2.834 in favor of peer-tutoring ($p < .001$). The Cohen's d effect size of 1.92 indicates a very large practical significance, meaning that peer-tutoring substantially outperformed drill-and-practice.
2. **Drill-and-practice versus expository:** The mean difference was 3.925 in favor of drill-and-practice ($p < .001$), with a Cohen's d of 3.52, also a very large effect.
3. **Peer-tutoring versus expository:** The mean difference was 6.759 in favor of peer-tutoring ($p < .001$), with an extremely large Cohen's d of 4.95.

These results demonstrate that both innovative instructional strategies (peer-tutoring and drill-and-practice) are significantly superior to the conventional expository method. Moreover, peer-tutoring is significantly more effective than drill-and-practice. Hence, the null hypothesis of no difference among the three methods is rejected, and the order of effectiveness is: peer-tutoring > drill-and-practice > expository.

Hypothesis two: There is no significant difference in the mean performance scores of male and female students taught the concept of Algebra using drill-and-practice instructional strategy.

Table 6: ANCOVA summary for gender differences within drill-and-practice group (post-test scores with pre-test as covariate)

Source	Type III Sum of Squares	df	Mean Square	F	p	Partial η^2
Pre-test (covariate)	7.034	1	7.034	5.887	.017	.068
Gender	2.164	1	2.164	1.811	.182	.022
Error	96.785	81	1.195			

R^2 = .087 (Adjusted R^2 = .064)

Table 6 revealed the results of an analysis of covariance (ANCOVA) conducted to determine whether there is a significant difference between male and female students' post-test performance in algebra when taught using the drill-and-practice instructional strategy, after controlling for their pre-test scores as a covariate.

First, the covariate (pre-test scores) showed a significant relationship with post-test performance, $F(1, 81) = 5.887$, $p = .017$, partial $\eta^2 = 0.068$. This indicates that students' prior knowledge of algebra had a small but statistically significant effect on their post-test scores within the drill-and-practice group, accounting for approximately 6.8% of the variance. More importantly, the main effect of gender was not statistically significant, $F(1, 81) = 1.811$, $p = .182$, partial $\eta^2 = 0.022$. This means that after adjusting for pre-test scores, there is no significant difference between the adjusted post-test mean scores of male and female students taught using the drill-and-practice instructional strategy. The partial eta squared value of 0.022 indicates a very small effect size, suggesting that gender explains only about 2.2% of the variance in post-test performance, which is negligible. Therefore, the null hypothesis of no significant difference between male and female students in the drill-and-practice group is retained.

Hypothesis three: There is no significant difference in the mean performance scores of male and female students taught the concept of Algebra using peer-tutoring instructional strategy.

Table 7: ANCOVA summary for gender differences within peer-tutoring group (post-test scores with pre-test as covariate)

Source	Type III Sum of Squares	df	Mean Square	F	p	Partial η^2
Pre-test (covariate)	27.632	1	27.632	10.762	.001	.105
Gender	0.304	1	0.304	0.118	**.732**	.001
Error	236.225	92	2.568			

R^2 = .105 (Adjusted R^2 = .086)

Table 7 presents the ANCOVA results comparing male and female students' post-test performance in algebra after being taught using the peer-tutoring instructional strategy, with pre-test scores as a covariate. The analysis revealed that the covariate (pre-test scores) had a significant effect on post-test performance, $F(1, 92) = 10.762$, $p = .001$, partial $\eta^2 = 0.105$, indicating that prior knowledge accounted for about 10.5% of the variance in post-test scores within the peer-tutoring group. However, the main effect of gender was not statistically significant, $F(1, 92) = 0.118$, $p = .732$, partial $\eta^2 = 0.001$. This means that after adjusting for pre-test differences, there is no significant difference between the adjusted post-test mean scores of male and female students taught using peer-tutoring. The effect size is negligible, with gender explaining only 0.1% of the variance. Therefore, the null hypothesis is retained. The peer-tutoring instructional strategy is gender-friendly, enhancing the academic performance of both male and female students equally.

DISCUSSION OF FINDINGS

The findings of this study in testing hypothesis one revealed a significant difference between the mean performance scores of students taught the concept of algebra using drill-and-practice and peer-tutoring instructional strategies. Hence, students taught using peer-tutoring instructional strategy had higher performance scores than their counterparts taught using drill-and-practice instructional strategy. The better facilitating effect of peer tutoring instructional strategy as experience in this study could be attributed to the fact that students in this group had the opportunity to recycle their learning process in their own pace. They were able to communicate with themselves as they learn with their peers thereby forming a social class in the learning environment. This finding is in line with the study of Areelu (2020) who showed that peer tutoring instructional strategy was more effective in enhancing students' achievement in mathematics than integrated curriculum instructional strategy. Also, the finding aligns with Ogunboyede (2023) who reported that drill-and-practice instructional package

significantly improved students' performance in mathematics compared to conventional method, but peer tutoring still produced higher gains in achievement.

The findings of this study in testing hypothesis two revealed that there was no statistically significant difference between male and female students' performance in the concept of algebra when taught using drill-and-practice instructional strategy. This implies that, drill-and-practice instructional strategy is effective irrespective of gender in fostering students' performance. This finding also agrees with Ogunboyede (2023) who found out in their study that there was no significant difference in the academic performance of male and female students taught mathematics using drill-and-practice instructional package. Similarly, Abasi and George (2025a) reported that gender had no influence on students' academic performance in mathematics when taught using game-based instructional approach.

The findings of this study in testing hypothesis three revealed that there was no statistically significant difference between male and female students' performance in the concept of algebra when taught using peer-tutoring instructional strategy. This implies that, peer-tutoring instructional strategy is effective irrespective of gender in fostering students' performance. This finding also agrees with Ogoke, Otumegwu and Nwaneri (2022) who concluded that peer tutoring instructional strategy is a gender friendly strategy as it enhances both male and female students' academic achievement in Mathematics. Also, Edem and Abasi (2025) reported that programmed instruction enhanced students' comprehension irrespective of gender.

CONCLUSION

Based on the findings of this study, the following conclusions were drawn:

1. Peer-tutoring is the most effective instructional strategy for teaching algebra in junior secondary school mathematics. Students taught using peer-tutoring achieved significantly higher post-test scores than those taught using drill-and-practice or the conventional expository method. This implies that peer-tutoring should be prioritized to improve students' academic performance in mathematics.
2. Both peer-tutoring and drill-and-practice are superior to conventional instruction. While peer-tutoring yielded the highest gains, drill-and-practice also produced significantly better outcomes than the expository method. Thus, either innovative strategy is preferable to traditional lecture-based teaching.
3. Both instructional strategies are gender-friendly. No significant gender differences were found within either the peer-tutoring or drill-and-practice groups. This implies that both strategies promote equal learning opportunities for male and female students.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made:

1. Mathematics teachers should adopt peer-tutoring as a primary instructional strategy for teaching algebra and other abstract concepts in mathematics. Given its superior effectiveness, peer-tutoring should be integrated into regular classroom practice to enhance students' understanding and retention.
2. Drill-and-practice should be used as a complementary strategy, especially for reinforcing procedural skills. Teachers are encouraged to combine drill-and-practice with peer-tutoring to provide a balanced approach that supports both independent practice and collaborative learning.
3. Government and educational stakeholders (e.g., Ministry of Education, TRCN, STAN) should organise in-service training and workshops to train mathematics teachers on the effective implementation of peer-tutoring and drill-and-practice strategies. Such training should include practical guidance on pairing students, tutor training, duration, and frequency of sessions.
4. Curriculum planners and school administrators should consider de-emphasising the exclusive use of conventional expository methods in favour of evidence-based, learner-centred strategies like peer-tutoring, which have been shown to dramatically improve student outcomes.

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