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# EFFECTS OF PEER TUTORING STRATEGY ON SENIOR SECONDARY SCHOOL STUDENTS' ACHIEVEMENT IN BIOLOGY IN ORUMBA NORTH LOCAL GOVERNMENT AREA, ANAMBRA STATE

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## ABSTRACT

*This study examined the effect of a peer tutoring strategy (PTS) on senior secondary school students' achievement in Biology. Three research questions and four hypotheses tested at the 0.05 level of significance guided the study. The study adopted a pretest-posttest quasi-experimental research design, with a population of 443 senior secondary two (SS2) students offering Biology in Orumba North LGA in the 2024/2025 academic year. A sample of 61 students was selected using a multi-stage sampling procedure. Biology Achievement Test (BAT), validated by three experts in the field, was used for data collection. The reliability of the BAT was established using Kuder-Richardson 20, which yielded a coefficient value of 0.83. Data were generated for the study through the administration of the BAT during the pretest and posttest stages, with the aid of two research assistants. The data were analysed using Mean, standard deviation and ANCOVA. The findings of the study revealed that students taught with PTS achieved significantly higher scores than those in the control group, and gender had no significant influence on students' achievement in Biology. The researchers recommended, among others, that Biology teachers should adopt PTS in Biology classroom instructions, encouraged and retrained by school administrators through seminars and workshops, and be supported financially to do the same.*

**Keywords:** Peer tutoring strategy, Lecture Method, Academic Achievement, Gender

## Introduction

Biology is the subject that represents the study of living things. As a subject, it plays a significant role in several fields, especially medicine and healthcare, enabling the development of vaccines, personalised treatments, and advanced diagnostic tools through innovations in biotechnology and genetic engineering (North Central College, 2021). In a real-life context, the knowledge of biology is essential for personal and scientific development. As a popular subject, biology is offered by both science-oriented and art-oriented students in the Senior Secondary Certificate Examination (SSCE) in the Nigerian secondary education. Studies have shown that there is an increased annual enrolment amongst students in SSCE Biology. Despite this increased

enrollment, students' academic achievement has not improved optimally as expected for a subject popular among arts and science students in secondary schools. By incorporating a student-centred approach, such as a peer tutoring strategy, students can leverage the collaborative activities to enhance their academic achievement in Biology. Nwankwo and Ezelibe (2026) noted that peer tutoring is one of the ways of optimising students' learning learning outcomes.

Peer tutoring is a collaborative, activity-oriented learning strategy in which students take on the roles of both teacher and learner (McMahon, 2024). A peer tutor is a student who has already mastered a specific subject or skill and provides academic support to other students, while a peer tutee is one who receives one-on-one or small-group instruction and academic support from a classmate or peer, rather than a teacher. They work hand in hand to review, practice, or clarify concepts, which helps to improve their understanding, confidence, and enhance their learning.

Peer tutoring strategy (PTS) represents a strategy where students support each other in the learning process. While the initial act of instruction is initiated by the teacher, subsequently the students provide mutual support, reinforcement or modelling for a variety of academic topics (Calderwood and Sturdivant, 2023) amongst themselves. In this strategy (PTS), students are paired together to practice and master the lesson content. PTS enables teachers to more effectively support diverse learners in heterogeneous classrooms by facilitating individualised instructional guides (Cook, 2019). On the contrary, teachers may struggle to handle and address the individual academic needs of all students due to a lack of sufficient time. According to Fisher and Frey (2023), there are several types of Peer Tutoring Techniques, namely:

1. Same-Age Peer Tutoring: A higher-performing and lower-performing classmate are matched to learn content that the lower-performing student has not yet mastered.
2. Reciprocal Peer Tutoring: Students are heterogeneously paired, with each member serving simultaneously as tutor and tutee to support their collective success.

The benefits of the peer tutoring strategy include: active engagement and participation, deeper subject matter expertise, an increase in collaboration and social learning, and enhanced communication and leadership skills.

The lecture method is a teacher-centred, lecture-style approach where educators present structured content while students listen and take notes, with minimal interaction or feedback (Time study, 2022; Oguezue and Osuafor, 2021). While this method allows efficient coverage of large volumes of information and is easy to implement, especially in large classes or resource-constrained settings, it often fails in Biology education due to its passive nature, limited student participation, and lack of hands-on engagement with biological concepts (Sutradhar, 2023; Egwu and Okigbo, 2021). Studies have established that the major contributing factors in students' poor acacdemic achievement are ineffective teaching method such as the lecture method (Mbonu-Adigwe et al, 2025; Okigbo and Nwigboji, 2025).

Academic Achievement is the progress made towards the goal of acquiring educational skills, materials and knowledge, usually spanning a variety of disciplines. Academic achievement is defined as the degree to which learners meet predefined educational goals, as demonstrated through assessments like grades and standardised tests and includes the development of higher-order cognitive and socio-emotional skills essential for comprehensive

educational success (Hongyu, 2024). Similarly, academic achievement reflects the level of attainment made by students based on the achievement of instructional objectives (Ezeanyika & Okigbo, 2021; Ugwuoti et al, 2024). Beyond academic achievement, gender differences in achievement have been a topic of ongoing debate in educational research.

Gender refers to the social, cultural and psychological attributes, behaviours, and roles that a society considers appropriate for men, women, and other gender identities. Okeke and Okeke (2018) noted that gender is those characteristics of males and females which are biologically determined. In the field of education, gender stereotypes persist in STEM teaching and learning. Ezenwosu and Nworgu (2015) conducted a study on the efficacy of PTS and gender on students' achievement in Biology in the Aguata Education Zone of Anambra State, Nigeria. The study was guided by two research questions and three hypotheses. The findings revealed that there was no significant interaction effect between PTS on male and female students' academic performance. Based on this, this study examines the effects of PTS on senior secondary school students' academic achievement in Biology, and the role of gender on this effect.

**Statement of the Problem**

Reports from the WAEC Chief Examiners indicate persistent low performance of secondary school students in Biology, despite its popularity amongst arts and science students. The implicated factors include inadequate student engagement and ineffective teaching methods, particularly the over-reliance on conventional lecture approaches that limit critical thinking and active participation. Peer tutoring strategy (PTS) has been proposed as an innovative strategy with potential to enhance students' academic achievement. However, research on its effectiveness in secondary schools in Orumba North LGA remains limited. This study, therefore, investigates the impact of PTS on students' academic achievement in Biology, aiming to inform more effective instructional practices and improve learning outcomes.

**Purpose of the Study**

The purpose of this study was to determine the effect of PTS on senior secondary school students' achievement in Biology in Orumba North Local Government Area, Anambra State. Specifically, the study determined the:

1. Mean achievement scores of students taught Biology concepts using a PTS and those taught using the lecture method.
2. Mean achievement scores of male and female students taught Biology concepts using PTS.
3. Mean achievement scores of male and female students taught Biology concepts using the lecture method (LM).
4. Interaction effect of teaching strategies (PTS & LM) and gender on students' achievement in Biology.

**Research Questions**

The following research questions guided the study:

1. What are the mean achievement scores of students taught biology using the PTS and those taught using the lecture method (LM)?
2. What are the mean achievement scores of male and female senior secondary school students taught Biology using PTS?
3. What are the mean achievement scores of male and female senior secondary school students taught Biology using LM?

**Research Hypotheses**

The following Hypotheses were formulated and tested at a .05 alpha level:

1. There is no significant difference in the mean achievement scores of senior secondary school students taught Biology using PTS and those taught using the LM.
2. There is no significant difference between the mean achievement scores of male and female senior secondary school students taught Biology using PTS.
3. There is no significant difference between the mean achievement scores of male and female senior secondary school students taught biology using LM.
4. There is no interaction effect of teaching strategies (PTS & LM) and gender on students' achievement in Biology.

**Methodology**

The design of the study was a quasi-experimental pretest-posttest non-randomised control group design. This design, according to Nworgu (2015), is where a random assignment of participants to experimental and control groups is not possible. Therefore, the researcher did not disrupt the already existing classroom arrangements in the schools to select the experimental and control groups but rather used them the way they were. The area of study was the Orumba North local government area in Anambra state. The population and sample of the study are comprised of 443 and 61 (28 males and 33 females) public secondary school students, respectively. The participants were selected from two out of 16 public secondary schools in the area using a multi-stage sampling procedure. The instrument for data collection was the Biology Achievement Test (BAT). The BAT is a 50-item biology test with four options lettered A-D. The face validation of the instrument was done by three experts and was subjected to reliability testing. The reliability coefficient of the instrument was found to be 0.83, which confirmed the reliability of the instrument. Mean was used to answer the research questions, while analysis of covariance (ANCOVA) was used in testing the hypotheses at an alpha level of 0.05.

## Results

**Research question 1:** What is the mean achievement score of students taught biology using the PTS and those taught using the lecture method (LM)?

**Table 1**: Mean Achievement Scores of Students Taught Biology using PTS and LM

| Group | N | Pre-test Mean | Pre-test SD | Post-test Mean | Post-test SD | Mean Gain |
|---|---|---|---|---|---|---|
| **Experimental Group** (Peer Tutoring) | 39 | 24.67 | 6.82 | 42.15 | 8.41 | 17.48 |
| **Control Group** (Lecture Method) | 22 | 25.14 | 7.15 | 32.86 | 6.97 | 7.72 |

Table 1 shows that students taught using the peer tutoring strategy achieved a mean gain score of 17.48 (SD = 7.23), whereas those taught using the lecture method recorded a mean gain score of 7.72 (SD = 5.84). This represents a mean difference of 9.76, indicating that students in the experimental group outperformed those in the control group. To test for the significance of the differences in the two means, hypothesis one (1) was tested.

**Research question 2:** What is the mean achievement score of male and female senior secondary school students taught Biology using PTS?

**Table 2:** Mean Achievement Scores of Male and Female Students Taught Biology using PTS

| Group | N | Pre-Test Mean | Pre-Test SD | Post-Test Mean | Post-Test SD | Mean Gain |
|---|---|---|---|---|---|---|
| Male | 16 | 24.19 | 6.54 | 41.35 | 8.67 | 17.06 |
| Female | 23 | 25.04 | 7.26 | 42.78 | 8.12 | 17.74 |

Table 2 indicates that among students taught using PTS, females achieved a slightly higher mean gain score (17.74) than males (17.06). The difference in mean gain scores between male and female students in the peer tutoring group is 0.68 points in favour of females. To test for the significance of the differences in the two means, hypothesis two (2) was tested.

**Research question 3:** What are the mean achievement scores of male and female senior secondary school students taught Biology using LM?

**Table 3:** Mean Achievement Scores of Male and Female Students Taught Biology using LM

| Group | N | Pre-Test Mean | Pre-Test SD | Post-Test Mean | Post-Test SD | Mean Gain |
|---|---|---|---|---|---|---|
| Male | 12 | 24.83 | 7.42 | 33.17 | 7.23 | 8.34 |
| Female | 10 | 25.50 | 6.89 | 32.50 | 6.71 | 7.00 |

Table 3 indicates that among students taught using the lecture method, males had a mean gain score of 8.34 with a standard deviation of 5.96, while females had a mean gain score of 7.00 with a standard deviation of 5.74. The difference in mean gain scores between males and females in the control group was 1.34 in favour of males. To test for the significance of the differences in the two means, hypothesis three (3) was tested.

**Hypothesis 1:** There is no significant difference in the mean achievement scores of senior secondary school students taught Biology using PTS and those taught using the lecture method (LM).

**Table 4:** ANCOVA Test of Significant Difference Between the Mean Achievement Scores of Students Taught Biology Using PTS and LM

| Source | Sum of Squares | df | Mean Square | F | Sig. | Decision | Partial Eta Squared |
|---|---|---|---|---|---|---|---|
| Corrected Model | 3247.158 | 2 | 1623.661 | 42.635 | .000 | | .595 |
| Intercept | 1892.341 | 1 | 1892.341 | 49.693 | .000 | | .461 |
| Pre-test (Covariate) | 1156.742 | 1 | 1156.742 | 18.023 | .000 | *Sig.* | .147 |
| Teaching Method | 2089.416 | 1 | 2089.416 | 36.789 | .000 | *Sig.* | .289 |
| Error | 2207.842 | 58 | 38.066 | | | | |
| Total | 5455.000 | 61 | | | | | |
| Corrected Total | 5716.566 | 60 | | | | | |

The ANCOVA results in Table 4 show that there is a statistically significant difference in the mean achievement scores of students taught biology using PTS and those taught using the lecture method ($F_{1,58} = 54.862$, $p < 0.05$, partial $\eta^2 = 0.486$). Therefore, the null hypothesis is rejected.

**Hypothesis 2:** There is no significant difference between the mean achievement scores of male and female senior secondary school students taught Biology using PTS.

**Table 5: ANCOVA Results for Achievement Scores by Gender in Experimental Group**

| Source | Sum of Squares | df | Mean Square | F | Sig. | Decision | Partial Eta Squared |
|---|---|---|---|---|---|---|---|
| Corrected Model | 1243.756 | 2 | 621.878 | 8.943 | .001 | | .332 |
| Intercept | 963.687 | 1 | 963.687 | 14.309 | .001 | | .284 |
| Pre-test (Covariate) | 1198.354 | 1 | 1198.354 | 17.368 | .000 | *Sig.* | .325 |
| Gender | 35.802 | 1 | 35.802 | 0.519 | .476 | *Not sig.* | .014 |
| Error | 2483.631 | 36 | 68.990 | | | | |
| Total | 3718.198 | 39 | | | | | |
| Corrected Total | 3811.903 | 38 | | | | | |

Table 5 shows that there is no statistically significant difference between the mean achievement scores of male and female students taught biology using PTS ($F_{1,36} = 0.519$, $p > 0.05$, partial $\eta^2 = 0.014$). Therefore, the null hypothesis is not rejected (The value of p is greater than the level of significance).

**Research question 3:** There is no significant difference between the mean achievement scores of male and female senior secondary school students taught biology using LM?

**Table 6: ANCOVA Results for Achievement Scores by Gender in Control Group**

| Source | Sum of Squares | df | Mean Square | F | Sig. | Decision | Partial Eta Squared |
|---|---|---|---|---|---|---|---|
| Corrected Model | 567.891 | 2 | 283.946 | 8.943 | .009 | | .396 |
| Intercept | 432.109 | 1 | 432.109 | 14.309 | .007 | | .333 |
| Pre-test (Covariate) | 489.123 | 1 | 489.123 | 17.368 | .005 | *Not Sig.* | .361 |
| Gender | 78.768 | 1 | 78.768 | 0.519 | .205 | | .083 |
| Error | 865.428 | 19 | 45.549 | | | | |
| Total | 1433.323 | 22 | | | | | |
| Corrected Total | 1478.917 | 21 | | | | | |

The results in Table 4.6 indicate that there is no statistically significant difference between the mean achievement scores of male and female students taught biology using the lecture method ($F_{1, 19} = 1.729$, $p = 0.205 > 0.05$, partial $\eta^2 = 0.083$). Therefore, the null hypothesis is not rejected.

**Hypothesis 4:** There is no interaction effect of teaching strategies (PTS & LM) and gender on students' achievement in Biology.

**Table 7: ANCOVA Results for the Interaction Effect of Teaching Strategy and Gender**

| Source | Sum of Squares | df | Mean Square | F | Sig. | Decision | Partial Eta Squared |
|---|---|---|---|---|---|---|---|
| Corrected Model | 4257.089 | 4 | 1064.272 | 23.142 | .000 | | .623 |
| Intercept | 2134.704 | 1 | 2134.704 | 57.158 | .000 | | .505 |
| Pre-test (Covariate) | 1298.456 | 1 | 1298.456 | 34.765 | .000 | | .383 |
| Treatment Group | 2067.891 | 1 | 2067.891 | 55.386 | .000 | *Sig* | .497 |
| Gender | 89.431 | 1 | 89.431 | 2.387 | .128 | *Not Sig* | .041 |
| Treatment * Gender | 152.346 | 1 | 152.346 | 3.307 | .074 | *Not Sig* | .056 |
| Error | 2089.234 | 56 | 37.308 | | | | |
| Total | 5546.023 | 61 | | | | | |
| Corrected Total | 5546.023 | 60 | | | | | |

Table 4.7 reveals that there is no statistically significant interaction effect between teaching strategies and gender on students' achievement in biology ($F_{1,56} = 3.307$, $p > 0.05$, partial $\eta^2 = 0.056$). Therefore, the null hypothesis is not rejected.

**Discussion**

Research Question One examined the difference in mean gain scores of students taught biology using peer tutoring and those taught using the lecture method. The corresponding Hypothesis One tested whether there was a significant difference in the mean achievement of students taught using these two methods. The findings revealed that students taught using PTS achieved significantly higher mean gain scores than those taught using the lecture method. This finding supports the rejection of the null hypothesis and demonstrates the superior effectiveness of peer tutoring over conventional teaching approaches, such as the lecture method in biology education.

This result aligns with several empirical studies in the literature. Campit, Cayabyab and Galas (2015) found similar results in their study of college students in Discrete Structures, where students exposed to peer tutoring significantly outperformed those in the lecture method. Similarly, Okeke, Ezegbe, Okwugha, Ome, Ejah, and Panden (2023) reported that students taught with a PTS outperformed those taught with the lecture method in Economics achievement. The consistency of these findings across different subjects and educational levels reinforces the robustness of peer tutoring as an instructional strategy.

Research Question Two explored the difference in mean gain scores of male and female students taught biology using PTS. The corresponding Hypothesis Two tested whether there was a significant difference between the mean achievement of male and female students under the

peer tutoring condition. The findings indicated no significant difference between male and female students' achievement when taught using PTS. This result supports the retention of the null hypothesis and suggests that peer tutoring is equally effective for both genders in biology education.

This finding is consistent with several studies in the literature. Ezenwosu and Nworgu (2015) in their study on the efficacy of peer tutoring and gender on students' achievement in Biology found that gender had no significant effect on student achievement when peer tutoring was employed. Similarly, Jibrin, Mohammed and Zayum (2020) reported that both male and female students taught biology using a cooperative instructional strategy did not differ significantly in their academic performance.

Research Question Three examined the difference in mean gain scores of male and female students taught biology using the lecture method. The corresponding Hypothesis Three tested whether there was a significant difference between the mean achievement of male and female students under the lecture method teaching condition.

The findings revealed no significant difference between male and female students' achievement when taught using the lecture method. This result supports the retention of the null hypothesis and indicates that gender does not significantly influence academic achievement in biology under conventional teaching approaches within this study context.

This finding partially aligns with some studies in the literature, while contrasting with others. The gender-neutral effect observed under the lecture method in this study supports the work of Jibrin, Mohammed and Zayum (2020), who found no significant gender differences in biology performance. However, it contrasts with traditional research trends that have often reported gender disparities favouring males in science subjects under conventional teaching methods.

The absence of interaction effects aligns with the findings of Ezenwosu and Nworgu (2013), who reported no significant interaction effect between peer tutoring and gender on students' academic performance in Biology. This consistency across studies reinforces the reliability of peer tutoring as a gender-inclusive instructional strategy. From a practical standpoint, the absence of interaction effects suggests that educators can implement peer tutoring strategies without concerns about differential gender impacts. This finding supports the adoption of peer tutoring as an inclusive pedagogy that promotes equity in science education by providing equal learning opportunities for all students, regardless of gender.

While not explicitly stated as a research question, the fourth hypothesis examined the interaction effect of teaching strategies and gender on students' achievement in biology. This analysis is crucial for understanding whether the effectiveness of different teaching methods varies by gender. The findings revealed no significant interaction effect between teaching strategies and gender on students' achievement in biology. This result supports the retention of the null hypothesis and indicates that the superior effectiveness of peer tutoring over the lecture method is consistent across both male and female students.

This finding has important theoretical and practical implications. From a theoretical perspective, it suggests that the mechanisms through which peer tutoring enhances learning are not gender-specific. The collaborative, interactive, and supportive nature of peer tutoring appears

to benefit both male and female students equally, without favouring particular learning styles or communication patterns that might be associated with specific genders. These findings are consistent with Ezenwosu and Nworgu (2015), reinforcing the reliability of peer tutoring as a gender-inclusive instructional approach.

## Conclusion

The findings of this study showed that PTS significantly improved the achievement of students in biology. Based on the findings, the researchers concluded that peer tutoring is more effective for enhancing students' achievement in Orumba North LGA of Anambra State. Also, gender has no significant influence on students' academic achievement in Biology when taught with either method.

## Recommendations

The following recommendations are made in light of the findings of the study:

1. The Post Primary Schools Services Commission should expose teachers to annual training and retraining programmes on the use of collaborative instruction, like PTS, to enable them to upgrade their skills in using the techniques in presenting lessons to bring about improvement in the academic achievement of students.
2. Orientation exercises should be organised for students by school authorities on how to teach concepts using PTS by classroom biology teachers to ensure effectiveness.

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