



## Article

# Effects of Peer-Tutoring Method of Teaching on Academic Achievement in Biology in Senior Secondary Schools in The Federal Capital Territory (FCT), Abuja

Ubom, A. E. B.<sup>1</sup>, Ekpo, C.G.<sup>2</sup> & Chigbo, G<sup>3</sup>

1. Department of Science & Environmental Education, Faculty of Education, University of Abuja
  2. Department of Science & Environmental Education, Faculty of Education, University of Abuja
  3. Department of Science & Environmental Education, Faculty of Education, University of Abuja
- \* Correspondence: [gckollings@gmail.com](mailto:gckollings@gmail.com)

**Abstract:** This study examines the effects of peer-tutoring method of teaching on academic achievement in Biology among Senior Secondary School II (SS II) students in the Federal Capital Territory (FCT), Abuja. The study employed a quasi-experimental research design, the pretest–posttest non-equivalent control group design. The population comprised 85,814 SS II Biology students in public secondary schools within the FCT Abuja, from which a sample of 110 students was drawn using a multi-stage sampling technique. The sample consisted of 53 students in the experimental group and 57 students in the control group. Data were collected using Biology Achievement Test (BAT) comprising 40 multiple-choice items. The instrument was validated by experts in science education and measurement, and its reliability was established using the Kuder–Richardson Formula 20 (KR-20), which yielded a coefficient of 0.81. Data collection involved the administration of the BAT as both pretest and posttest to the two groups before and after the instructional treatment. The experimental group was taught using the peer tutoring instructional strategy, while the control group was taught using the conventional teaching method. Data were analyzed using mean and standard deviation to answer the research questions, while Analysis of Covariance (ANCOVA) was used to test the hypotheses at the 0.05 level of significance, with pretest scores serving as covariates. The findings of the study revealed a statistically significant difference in the mean academic achievement scores of students taught Biology using peer tutoring and those taught using the conventional teaching method, in favour of the peer tutoring group. The study concluded that peer tutoring is an effective instructional strategy for improving students' academic achievement in Biology. Based on this finding, it was recommended that Biology teachers should adopt peer tutoring as a learner-centered instructional approach to enhance students' academic performance in secondary schools.

**Keywords:** Peer tutoring, academic achievement, peer-tutoring method.

**Citation:** Ubom, A. E. B., Ekpo, C.G. & Chigbo, G. Effects of Peer-Tutoring Method of Teaching on Academic Achievement in Biology in Senior Secondary Schools in The Federal Capital Territory (FCT), Abuja. Vital Annex: International Journal of Novel Research in Advanced Sciences 2026, 5(3), 5-15.

Received: 10<sup>th</sup> Feb 2026

Revised: 21<sup>st</sup> Mar 2026

Accepted: 18<sup>th</sup> Apr 2026

Published: 05<sup>th</sup> May 2026



**Copyright:** © 2026 by the authors. Submitted for open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>)

## 1. Introduction

Science education constitutes a fundamental pillar for national development, technological innovation, and the advancement of human capital. It provides the intellectual and practical frameworks through which individuals develop problem-solving abilities, scientific reasoning, and the capacity to interact meaningfully with their environment. Within the Nigerian educational system, science is institutionalized as a core component of secondary education, with Biology, Chemistry, and Physics forming the major disciplinary strands. Among these, Biology occupies a distinctive position as a compulsory subject for all senior secondary school students due to its direct relevance to health, agriculture, environmental sustainability, and numerous science-based

professions. Consequently, the quality of Biology instruction has significant implications for both individual academic progression and broader national development goals [1].

Despite its recognized importance, empirical evidence from public examinations has consistently indicated that students' academic achievement in Biology remains suboptimal. Reports from the West African Senior School Certificate Examination (WASSCE) over the years reveal persistent patterns of low performance, characterized by poor conceptual understanding, inadequate practical competencies, and limited ability to apply biological knowledge to real-life situation. These recurring deficiencies suggest systemic challenges within the instructional processes employed in Biology classrooms, thereby raising concerns about the effectiveness of prevailing pedagogical approaches in facilitating meaningful learning outcomes [2].

A critical examination of classroom practices indicates that conventional teaching methods predominantly teacher-centered and lecture-driven continue to dominate instructional delivery in many Nigerian secondary schools. Such approaches often position learners as passive recipients of knowledge, thereby limiting opportunities for active engagement, collaborative learning, and cognitive elaboration. The implication is that students are less likely to develop higher-order thinking skills, which are essential for deep conceptual understanding and sustained academic achievement. In response to these limitations, contemporary educational discourse increasingly emphasizes the adoption of learner-centered instructional strategies that promote active participation, social interaction, and knowledge co-construction [3].

One such pedagogical innovation is peer tutoring, an instructional strategy grounded in social constructivist principles and the social development theory of learning. Peer tutoring involves structured interactions in which students assume reciprocal roles as tutors and tutees, enabling more knowledgeable learners to support their peers in understanding academic content under the guidance of the teacher. This approach operationalizes the concept of the Zone of Proximal Development, where learning is optimized through collaborative engagement and guided assistance. By facilitating dialogue, explanation, and feedback among peers, peer tutoring enhances cognitive processing and reinforces knowledge retention, thereby contributing to improved academic achievement [4].

Academic achievement, which serves as the primary outcome variable in this study, is a critical indicator of the effectiveness of instructional strategies and the extent to which educational objectives are realized. It reflects the measurable learning outcomes attained by students in terms of knowledge acquisition, skill development, and the ability to apply learned concepts in evaluative contexts. Given its central role in educational evaluation, improving students' academic achievement in Biology remains a priority for educators and policymakers alike. The adoption of innovative instructional approaches such as peer tutoring is therefore imperative in addressing the persistent underperformance observed in the subject [5].

In addition to instructional strategies, learner characteristics and gender have been identified as potential moderating factors influencing academic achievement. Gender, as a socially constructed variable encompassing roles, expectations, and behavioral patterns associated with males and females, may shape students' learning experiences, participation levels, and academic outcomes. While some empirical studies report gender-based differences in science achievement, others suggest that learner-centered instructional strategies can mitigate such disparities by creating inclusive and collaborative learning environments that support all students equally. This underscores the need to examine not only the direct effect of peer tutoring on academic achievement but also its interaction with gender as a moderating variable [6].

Against this backdrop, the persistent challenges associated with students' low academic achievement in Biology, coupled with the limitations of conventional instructional methods, necessitate the exploration of alternative pedagogical strategies

that are both effective and inclusive. Although previous studies have examined the impact of peer tutoring across different subjects, there remains a contextual gap regarding its effectiveness in improving Biology achievement among senior secondary school students in the Federal Capital Territory (FCT), Abuja. This study therefore seeks to evaluate the effect of peer tutoring instructional strategy on students' academic achievement in Biology, while also examining the moderating role of gender, with a view to providing empirical evidence that can inform instructional practices and educational policy [7].

#### **Purpose of the Study**

The purpose of this study was to examine effects of peer tutoring instructional strategy on students' academic achievement in Biology among senior secondary school students in the Federal Capital Territory, Abuja. Specifically, the study sought to:

1. Determine the difference in the mean achievement scores of students taught Biology using peer tutoring and those taught using conventional teaching methods.
2. Examine the influence of gender on the academic achievement of students exposed to peer tutoring instructional strategy.

#### **Research Questions**

1. What is the difference in the mean academic achievement scores of students taught Biology using peer tutoring and those taught using conventional teaching methods?
2. What is the difference in the mean academic achievement scores of male and female students taught Biology using peer tutoring?

#### **Hypotheses**

H01: There is no significant difference in the mean academic achievement scores of students taught Biology using peer tutoring and those taught using conventional teaching method.

H02: There is no significant difference in the mean academic achievement scores of male and female students taught Biology using peer tutoring.

#### **Literature Review**

Peer tutoring is widely recognized as a learner-centered instructional approach that promotes interaction, collaboration, and shared responsibility in the learning process. It involves structured pairing or grouping of students, where more knowledgeable learners (tutors) assist less knowledgeable peers (tutees) under the guidance of the teacher. This instructional strategy aligns with contemporary educational paradigms that emphasize active participation and knowledge co-construction. Abdullahi (2016) describes peer tutoring as a systematic pairing of students to facilitate learning tasks, while Seo and Kim (2019) conceptualize it as a collaborative process through which knowledge and skills are acquired via peer support. Similarly, Yurt and Aktaş (2016) argue that peer tutoring allows learners to internalize concepts more effectively through dialogue and explanation. The effectiveness of peer tutoring, however, depends on appropriate implementation. Proper pairing based on ability levels, adequate training of tutors, and teacher supervision are critical to ensuring meaningful learning outcomes. Without these conditions, the strategy may fail to achieve its intended objectives [8].

The pedagogical value of peer tutoring extends across cognitive, affective, and social domains. It enhances students' understanding of complex concepts, promotes retention, and develops higher-order thinking skills. In Biology, where abstract concepts and technical terminologies often pose challenges, peer tutoring provides opportunities for learners to clarify ideas through peer explanation and discussion. Furthermore, peer tutoring fosters motivation, confidence, and positive attitudes toward learning. It encourages collaboration, improves communication skills, and creates a supportive learning environment. Eisenkopf (2018) also highlights its role in enhancing social interaction and reducing behavioral challenges among students. Despite these benefits, the success of peer tutoring is not automatic. Its effectiveness varies depending on

classroom context, implementation fidelity, and students' readiness to engage in collaborative learning [9].

Academic achievement is a central indicator of educational effectiveness and reflects the extent to which instructional objectives have been attained. It encompasses the acquisition of knowledge, skills, and competencies, typically measured through tests and examinations. In Biology education, academic achievement is particularly significant due to the subject's relevance to health, agriculture, and environmental sustainability. However, persistent reports of low performance in Biology examinations suggest systemic instructional challenges. Evidence from external examinations indicates that students often exhibit poor conceptual understanding, weak practical skills, and limited ability to apply knowledge. These challenges have been attributed to factors such as inadequate teaching methods, lack of resources, and low student interest. Consequently, there is a growing need for innovative instructional strategies that can enhance learning outcomes [10].

Gender remains an important variable in educational research, particularly in science education. It is defined as a socially constructed set of roles, behaviors, and expectations associated with males and females. Empirical studies on gender and academic achievement have produced mixed findings. While some studies report significant gender differences in science performance, others indicate that such differences are minimal or non-existent when effective instructional strategies are employed. Peer tutoring, in particular, has been found to create inclusive learning environments that minimize gender disparities by promoting equal participation [11].

This study is anchored on Vygotsky's Social Development Theory, which emphasizes the role of social interaction in cognitive development. The theory posits that learning occurs through interaction with more knowledgeable others and is facilitated within the Zone of Proximal Development (ZPD). Peer tutoring operationalizes this theory by enabling students to learn collaboratively and support one another in constructing knowledge. Through guided interaction, learners are able to bridge gaps in understanding and achieve higher levels of cognitive development. Constructivism, as proposed by Piaget, asserts that learners actively construct knowledge through interaction with their environment. Learning is therefore an active process involving exploration, reflection, and collaboration. Peer tutoring aligns with constructivist principles by encouraging learners to engage in dialogue, ask questions, and co-construct knowledge. The teacher's role shifts from information provider to facilitator, creating opportunities for meaningful learning experiences [12].

Empirical evidence consistently supports the effectiveness of peer tutoring in enhancing academic achievement. Studies such as Azubuike (2017); Jibrin and Zayum (2018) found that students taught using peer tutoring performed significantly better than those taught using conventional methods. Similar findings were reported by Longjohn and Osila (2022), who observed improved performance among students exposed to peer tutoring strategies. However, findings on gender are less consistent. While some studies report no significant gender differences in achievement under peer tutoring. Additionally, comparative studies reveal that other learner-centered strategies, such as cooperative learning and jigsaw methods, may also yield significant improvements in academic achievement [13]. These findings suggest that while peer tutoring is effective, its relative impact may depend on contextual and methodological factors. The reviewed literature demonstrates that peer tutoring is a theoretically grounded and empirically supported instructional strategy capable of enhancing academic achievement in Biology. It promotes active engagement, collaborative learning, and cognitive development. However, variations in findings across studies highlight the influence of contextual factors such as location, subject area, and research design. Notably, there is limited research focusing specifically on the FCT Abuja context, particularly with respect to the interaction between peer tutoring and gender. This gap underscores the need for the present study, which

seeks to provide context-specific evidence on the effectiveness of peer tutoring in improving students' academic achievement in Biology [15].

## 2. Methodology

This study employed a quasi-experimental research design, the pretest–posttest non-equivalent control group design. This design is appropriate in educational settings where intact classes are used and random assignment of participants is not feasible Howard and Shagun (2019). The population of the study consisted of 85,814 senior secondary school II (SS II) students enrolled in public secondary schools within the Federal Capital Territory (FCT), Abuja, during the 2023/2024 academic session. These students were distributed across 88 public senior secondary schools. A total of 110 SS II Biology students constituted the sample for the study. A multi-stage sampling procedure was employed to ensure representativeness and minimize sampling bias.

Table 1. Sample size of Selected SS II Biology Students

Group	Sample		Total
	Male	Female	
Experimental	28	25	53
Control	33	24	57
Total	61	49	110

The instrument used for data collection was the Biology Achievement Test (BAT), which, consisted of 40 multiple-choice items. The BAT was subjected to both face and content validity to ensure that it adequately measured students' academic achievement in Biology. Validation was carried out by three experts: one specialist in Science Education and two experienced Biology teachers. The experts examined the instrument based on relevance to curriculum objectives, clarity of items, appropriateness of language, and suitability of response options. To determine the reliability of the BAT, a pilot test was conducted using 25 SS II students from a school outside the study sample. The reliability coefficient was computed using the Kuder–Richardson Formula 20 (KR-20), appropriate for dichotomously scored items. A reliability coefficient of 0.81 was obtained, indicating high internal consistency and confirming that the instrument was reliable for measuring academic achievement. After the treatment period, the BAT was re-administered to both groups to assess changes in academic achievement. All test scripts were collected, scored, and properly documented for analysis. Data collected were analyzed using both descriptive and inferential statistics. Mean and standard deviation were used to answer research questions and describe students' achievement. Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance, with pretest scores serving as covariates. The analysis was conducted using SPSS Version 23.

## 3. Result and Discussion

### Results

The data for the study were presented under the following sub-headings;

#### Demographic Data

The characteristics of the subjects that constituted the sample in respect of groups and gender were presented in Table 2

Table 2. Distribution of Sample According to Groups and Gender

Groups	Gender		N
	Male	Female	
Experimental	28	25	53
Control	33	24	57

Groups	Gender		N
	Male	Female	
<b>Total</b>	<b>61</b>	<b>49</b>	<b>110</b>

Table 2 indicates the distribution of students who participated in the study according to groups and gender. An analysis of the sample showed that out of one hundred and ten (110) students, fifty-three (53) students of the sample were categorized for the experimental group while fifty-seven (57) students were in the control group. It then means that students in the control group were in the majority. Also indicates the distribution of students who participated in the study according to gender. Further analysis reveals that out of the one hundred and ten (110) students that participated, sixty-one (61) students were male while forty-nine (49) students were female. It means that majority of the entire sample were male [16].

#### Data Analysis

**Research Question One:** What is the difference between the mean achievement scores of senior secondary school students taught biology using the peer tutoring method of teaching and those taught using the conventional teaching method in Federal Capital Territory, Abuja?

To answer this research question, frequency, mean and standard deviation was used as reported in Table 3.

Table 3. Mean and Standard Deviation of Achievement scores of Biology students in experimental and control groups

Group	N	Pretest $\bar{x}$	SD	Posttest $\bar{x}$	SD	Mean Difference
Experimental	53	17.96	1.88	32.45	1.95	14.49
Control	57	18.30	1.63	28.86	1.57	10.56
<b>Mean Difference</b>		0.34		<b>3.60</b>		<b>3.93</b>
<b>Totals</b>	<b>110</b>					

Table; 3: indicates the mean and standard deviation on pretest and posttest achievement scores in respect to groups. From the results obtained, students in experimental group had a mean achievement score of 17.96 with a standard deviation of 1.88 for pretest while for the posttest was 32.45 and 1.95 respectively. However, the mean and standard deviation for the students in control group was 18.30 and 1.63 in the pre-test, while that for the posttest was 28.86 and 1.57 respectively. Again, the mean gain for experimental and control group are 14.49 and 10.56 respectively. The overall mean difference between the groups was 3.60. It therefore means that experimental group (peer tutoring method of teaching) achieved higher than the control group (conventional teaching method) [17].

**Research Question Two:** What is the difference between the mean achievement scores of male and female senior secondary school students taught biology using the peer tutoring method of teaching in Federal Capital Territory, Abuja?

To answer this research question, frequency, mean and standard deviation was used as reported in Table 4.

Table 4. Mean and Standard Deviation of Achievement Scores of male and female Biology students in Experimental group

Gender	N	$\bar{x}$	SD	$\bar{x}$ Gain	$\bar{x}$ Diff	Decision
Male	28	32.68	1.90	2.79	0.48	Not Significant
Female	25	32.20	2.02			
Total	53					

Table 4 shows the mean and standard deviation on the achievement scores of male and female students in experimental group. From the results obtained, male students had a mean achievement score of 32.68 with a standard deviation of 1.90. However, the mean and standard deviation for female students was 32.20 and 2.02. Again, the mean gain for male and female students was 2.79. The mean difference between the groups was 0.48. This indicates that the male student had slightly higher achievement than their female counterpart.

#### Test of Hypotheses

**H<sub>01</sub>:** There is no significant difference between the mean achievement scores of senior secondary school students taught Biology using the peer tutoring method of teaching and those taught using conventional teaching method. To test for this hypothesis, ANCOVA statistics was used and the results presented in Table 5.

Table 5. ANCOVA Analysis of Mean Achievement Scores of Students in Experimental and Control groups

Source	Type III Sum of Squares	Df	Mean Square		Sig.	Decision Rule
Corrected Model	367.911 <sup>a</sup>	2	183.955	60.623	.000	Significant Rejected
Intercept	1182.513	1	1182.513	389.703	.000	
Pretest	13.329	1	13.329	4.393	.038	
Group	338.314	1	338.314	111.493	.000	
Error	324.680	107	3.034			
Total	103631.000	110				
Corrected Total	692.591	109				

The test of hypothesis in Table 5 conducted was to determine if there was no significant difference in the mean achievement scores of Biology students taught peer tutoring method of teaching and those taught using the conventional teaching method. The result from the table revealed that  $F(1, 109) = 111.493$  and  $P = 0.000$  for the main treatment. The significant  $p$ -value (0.00) was less than 0.05 level of significant ( $p < 0.05$ ). Thus, the null hypothesis was rejected. Hence, there was significant difference in the mean achievement scores of Biology students taught using peer tutoring method of teaching and those taught using the conventional teaching method.

**H<sub>02</sub>:** There is no significant difference between the mean achievement scores of male and female senior secondary students taught Biology using the peer tutoring method of teaching. To test for this hypothesis, ANCOVA statistics was used and the results presented in Table 6.

Table 6. ANCOVA Analysis of Mean Interest Scores of Male and Female Students in the Experimental group

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Decision Rule
Corrected Model	4.990	2	2.495	5.942	.005	Not Significant
Intercept	25.703	1	25.703	61.216	.000	
PRETEST	3.945	1	3.945	9.395	.004	
GENDER	1.175	1	1.175	2.799	.101	Accepted
Error	20.994	50	.420			
Total	452.439	53				

Corrected	25.984	52				
Total						

The test of hypothesis in Table 6 was carried out to find out if there was no significant difference in the mean interest scores of male and female Biology students taught using peer tutoring method of teaching. The result from the table revealed that  $F(1, 52) = 2.799$  and  $P = 0.101$  for gender. The significant  $p$ -value of 0.101 was greater than 0.05 level of significance ( $p > 0.05$ ). Thus the null hypothesis was accepted. Hence, there is no significant difference in the mean interest scores of male and female Biology students taught using peer tutoring method of teaching [18].

### Discussion of Findings

The findings of the study revealed a statistically significant difference in the mean academic achievement scores of students taught Biology using the peer tutoring instructional strategy and those taught using the conventional teaching method, with students in the peer tutoring group demonstrating superior performance. This outcome suggests that peer tutoring is more effective in facilitating students' understanding of biological concepts compared to the traditional lecture-based approach. The improved performance of students exposed to peer tutoring may be attributed to the interactive and participatory nature of the strategy, which encourages active engagement, collaborative problem-solving, and deeper cognitive processing. This finding is consistent with earlier studies which reported that peer tutoring enhances academic achievement by promoting meaningful learning experiences. For instance, studies by Abdullahi (2016), Azubuike (2017), and Jibrin and Zayum (2018) established that students taught using peer tutoring outperformed their counterparts taught using conventional methods. Similarly, Longjohn and Osila (2022) found that peer tutoring significantly improved students' performance by fostering better understanding and retention of subject matter. The agreement between the present study and these previous findings reinforces the growing body of evidence supporting the effectiveness of learner-centered instructional strategies in science education [19].

The improvement with peer tutoring observed in this study can also be explained within the framework of Vygotsky's Social Development Theory, which emphasizes the role of social interaction in learning. Through peer tutoring, students engage in collaborative dialogue within their Zone of Proximal Development, allowing them to construct knowledge with the support of more capable peers. This process not only enhances comprehension but also promotes the development of higher-order thinking skills. In addition, the constructivist perspective further supports this finding, as it posits that learners actively construct knowledge through interaction and shared experiences, both of which are integral to peer tutoring. In contrast, the relatively lower performance observed among students taught using the conventional teaching method may be attributed to its teacher-centered nature. In such settings, students often assume passive roles, with limited opportunities for interaction, questioning, and critical thinking. This limits their ability to internalize concepts and apply knowledge effectively, thereby resulting in lower academic achievement. With respect to gender, the findings indicated that there was no statistically significant difference in the academic achievement of male and female students taught using the peer tutoring instructional strategy, although male students recorded slightly higher mean scores. This suggests that peer tutoring provides an equitable learning environment that supports both male and female students equally, minimizing gender disparities in academic performance.

This finding aligns with studies such as Abdul-Raheem, et al., (2017) and Okereke, et al., (2020), which reported no significant gender differences in academic achievement under peer tutoring conditions. These studies suggest that learner-centered strategies, particularly those that emphasize collaboration and inclusivity, can effectively bridge gender gaps in science education. However, the slight variation in mean scores observed in favor of male students is consistent with findings by Ogundola (2017), who reported marginal gender differences, though not statistically significant. The absence of significant gender differences in this study may be attributed to the structure of peer tutoring, which

encourages equal participation, mutual support, and shared responsibility among learners. By creating an inclusive and interactive learning environment, peer tutoring reduces the influence of gender-based stereotypes and allows all students to benefit from the instructional process. Overall, the findings of this study underscore the pedagogical value of peer tutoring as an effective and inclusive instructional method for improving students' academic achievement in Biology [20].

#### 4. Conclusion

This study examined the effects of peer tutoring instructional strategy on students' academic achievement in Biology among Senior Secondary School II students in the Federal Capital Territory (FCT), Abuja. Based on the findings, it is evident that peer tutoring significantly enhances students' academic achievement when compared to the conventional teaching method. The strategy promotes active engagement, collaborative learning, and deeper conceptual understanding, all of which contribute to improved learning outcomes. Furthermore, the study established that gender does not significantly influence students' academic achievement when exposed to peer tutoring, indicating that the strategy provides an inclusive learning environment that supports both male and female students equitably. Although slight differences in mean scores were observed, these were not statistically significant. In essence, the study concludes that peer tutoring is an effective, learner-centered instructional strategy capable of improving students' academic achievement in Biology, while also minimizing gender disparities in learning outcomes.

#### Recommendations

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

- a. Biology teachers should adopt peer tutoring as a complementary instructional strategy to enhance students' academic achievement and engagement in the classroom.
- b. Teacher education programmes should incorporate training on learner-centered instructional strategies, including peer tutoring, to equip teachers with practical implementation skills.
- c. School administrators should support the use of peer tutoring by providing enabling classroom environments that facilitate interaction and collaboration among students.
- d. Educational policymakers should integrate peer tutoring into curriculum guidelines and instructional frameworks for science education at the secondary school level. Further studies should be conducted in other subject areas and educational contexts to validate and extend the findings of this study.

#### Implications of the Study

The findings of this study have several important implications for educational practice, policy, and research. First, the demonstrated effectiveness of peer tutoring suggests a shift from traditional teacher-centered approaches to more learner-centered pedagogies in Biology classrooms. Teachers are encouraged to adopt instructional strategies that actively involve students in the learning process, thereby enhancing understanding and retention. Second, the study highlights the importance of collaborative learning environments in promoting academic achievement. Schools should create structures that encourage peer interaction as integral components of instruction. Third, the finding that gender does not significantly influence achievement under peer tutoring conditions implies that such strategies can be used to promote equity in science education. This has implications for addressing long-standing gender disparities in STEM subjects. Additionally, curriculum planners and educational policymakers should consider integrating peer tutoring into instructional guidelines and teacher training programs. This would ensure that teachers are adequately equipped with the skills required to implement the strategy effectively. Finally, the study contributes to the ongoing discourse on

improving science education in Nigeria by providing empirical evidence supporting innovative teaching approaches that enhance students' academic performance.

### **Contributions to Knowledge**

This study makes several significant contributions to knowledge in the field of science education. First, it provides empirical evidence on the effectiveness of peer tutoring in improving students' academic achievement in Biology within the context of the Federal Capital Territory (FCT), Abuja, thereby addressing a contextual gap in existing literature. Second, the study contributes to the understanding of gender dynamics in learning by demonstrating that peer tutoring minimizes gender differences in academic achievement, thus supporting its use as an inclusive instructional strategy. Third, it reinforces the applicability of social constructivist and collaborative learning theories in real classroom settings, particularly in science education. Finally, the study expands the body of literature on innovative teaching strategies by highlighting peer tutoring as a practical and effective approach for enhancing learning outcomes in secondary school Biology.

### **REFERENCES**

- [1] B. G. Aregbesola and Y. Bara'u, "Enhancing conceptual understanding of science education through open educational resources (OER) pedagogy," in Proceedings of CUSTECH 1st International Educational Conference, 2025. [Online]. Available: <http://custechijoe.org.ng>
- [2] O. C. Azubuike, "Effect of peer tutoring on students' achievement in Biology in secondary schools," *African Journal of Educational Research*, vol. 21, no. 1, pp. 112–120, 2017.
- [3] E. J. Chukwuemeka and B. G. Aregbesola, "Secondary school teachers' proficiency in integrating technology within subject-matter contexts in Nigeria," *Ilorin Journal of Education*, vol. 45, no. 2, 2025. [Online]. Available: <https://ije.unilorinedu.sch.ng/index.php/ije/article/view/245>
- [4] P. E. Ehirheme and U. Eze, "Influence of peer tutoring on students' academic achievement in science subjects," *International Journal of Educational Research*, vol. 9, no. 1, pp. 77–85, 2021.
- [5] C. G. Ekpo, I. A. Ojelade, and B. G. Aregbesola, "Effects of 3-dimensional computer simulation on secondary school students' academic achievement in chemistry," *Journal of Science and Science Education*, vol. 5, no. 2, pp. 18–25, 2021.
- [6] G. Eisenkopf, "Peer effects and student achievement: Evidence from classroom settings," *Education Economics*, vol. 26, no. 2, pp. 123–140, 2018.
- [7] K. V. Fatokun, F. O. Onwoke, and A. A. Sambo, "Gender differences and students' achievement in science subjects," *International Journal of Science Education*, vol. 40, no. 6, pp. 645–657, 2018.
- [8] N. C. Hur-Yagba and B. G. Aregbesola, "Blended learning model for enhancing STEM career awareness among urban and rural secondary school learners," *American Journal of Science on Integration and Human Development*, vol. 3, no. 8, pp. 1–12, 2025.
- [9] C. C. Ihekwoaba et al., "Biology education and national development in Nigeria," *Journal of Science Education and Practice*, vol. 12, no. 1, pp. 56–63, 2020.
- [10] G. Ilieva, "Collaborative learning and academic achievement: A review," *Educational Research Review*, vol. 14, no. 2, pp. 89–101, 2019.
- [11] A. Jibrin and S. D. Zayun, "Effect of peer tutoring on students' academic achievement in Biology in secondary schools," *Nigerian Journal of Educational Studies*, vol. 15, no. 2, pp. 98–105, 2018.
- [12] F. R. Kabutu et al., "Academic achievement and instructional strategies in science education," *Journal of Educational Research*, vol. 11, no. 1, pp. 67–75, 2018.
- [13] T. Longjohn and M. Osila, "Effects of peer tutoring on students' academic achievement in Biology in secondary schools," *International Journal of Science Education*, vol. 44, no. 5, pp. 765–780, 2022.
- [14] M. I. Odo and C. Nwachukwu, "Analysis of students' performance in Biology in WASSCE examinations," *West African Journal of Education*, vol. 40, no. 1, pp. 120–130, 2020.
- [15] P. N. Okafor and F. O. Arinze, "Gender and academic achievement in science education," *African Journal of Educational Psychology*, vol. 6, no. 1, pp. 44–52, 2020.
- [16] S. C. Okereke, L. F. Ademiluyi, and A. O. Adeagbo, "Effects of peer tutoring on students' academic achievement in science subjects," *Journal of Educational Sciences*, vol. 14, no. 3, pp. 89–97, 2020.

- 
- [17] K. Seo and M. Kim, "Peer tutoring and collaborative learning in secondary education," *Asia-Pacific Education Review*, vol. 20, no. 3, pp. 451–463, 2019.
- [18] I. B. Sutresna and A. Wijayanti, "Peer tutoring and student motivation in science learning," *International Journal of Instruction*, vol. 13, no. 2, pp. 455–470, 2020.
- [19] K. J. Topping, D. Duran, and H. Van Keer, "Peer tutoring in education: A systematic review," *Educational Research Review*, vol. 25, pp. 1–15, 2018.
- [20] A. E. B. Ubom, I. A. Ojelade, B. G. Aregbesola, and F. I. Chiekwene, "Effect of guided discovery teaching strategy on students' achievement in basic science, Federal Capital Territory, Abuja," *Web of Scholars: Multidimensional Research Journal*, vol. 3, no. 8, pp. 50–60, 2024. [Online]. Available: <https://innosci.org/wos>
- [21] E. Yurt and M. Aktaş, "The effects of peer tutoring on academic achievement," *Journal of Education and Training Studies*, vol. 4, no. 6, pp. 1–9, 2016.