

Effect of Peer-Tutoring Strategy on Performance in Basic Science Concepts among Secondary School Students in Zaria Education Zone, Kaduna State, Nigeria

MAMMAN, Grace
Gracyyakman@mail.com
08136990755

Department of Science Education, Ahmadu Bello University, Zaria

Abstract

This study examined the effect of peer-tutoring on academic performance of Junior Secondary School (JSS) students in Basic Science in Zaria Education Zone, Kaduna State, Nigeria. The study was guided by two objectives, two research questions, and two null hypotheses. A pre-test, post-test quasi-experimental design was employed, involving an experimental group taught using peer-tutoring strategy and a control group taught using conventional methods. The population comprised 18,508 students from 28 co-educational schools, with a sample of 125 students selected through purposive and simple random sampling techniques. The Basic Science Concepts Performance Test (BSCPT) was used as the instrument for data collection. The BSCPT was validated by two experts in science education, and its reliability was established at 0.81 using the Kuder-Richardson formula. Data analysis involved descriptive statistics (mean and standard deviation) and inferential statistics (independent sample t-test) at a 0.05 significance level. Findings revealed a significant difference in the academic performance of students taught using peer-tutoring, with a mean difference of 6.35 in favor of the experimental group. Additionally, no significant gender differences were observed in the performance of male and female students exposed to peer-tutoring, indicating its gender-friendly nature. The study concluded that, peer-tutoring significantly improves academic performance in Basic Science concepts and promotes collaborative learning. It was recommended that Basic Science teachers incorporate peer-tutoring into their instructional strategies, curriculum planners integrate it into the curriculum, and textbook authors include peer-tutoring methodologies to enhance student engagement and achievement.

Keywords; (Peer-tutoring, Basic Science, Academic Performance, Gender)

Introduction

The increasing demand for effective teaching strategies which addressed the diverse needs of students had garnered significant attention in educational research. Among the numerous instructional approaches, the peer-tutoring strategy emerged as a promising method for enhancing student performance and engagement. Peer tutoring, as described by Shubeck (2022), involved cooperative learning in which one student (the tutor) provides academic assistance to another (the tutee) under the guidance of their teacher. This strategy fosters collaboration, critical thinking, and mutual support, creating an interactive learning environment that benefits both the tutor and the tutee (Shubeck, 2022). Basic science education plays a pivotal role in equipping students with the foundational knowledge and skills required for technological advancement and problem-solving. Gbordzoe (2020) revealed that, students' academic performance in basic science subjects has been suboptimal, often attributed to teacher-centered instructional methods such as lectures and note dictation. These conventional strategies fail to actively engage learners, resulting in low interest and achievement levels. According to Okoye, (2017) this challenge highlights the need for student-centered approaches like peer tutoring, which would address these gaps by promoting active participation of students and improving conceptual understanding. Peer tutoring involves students teaching and learning from each other, with tutors and tutees collaborating to achieve academic goals. This strategy has been shown to enhance knowledge retention, critical thinking, and problem-solving skills, as noted by Okoye (2017).

Peer tutoring is in line with the goals of Nigeria's National Policy on Education (FRN, 2013), which emphasizes the need for innovative teaching methods that promote active learning and critical thinking. The strategy's emphasized on collaboration and mutual learning and particularly suited to addressing the challenges of students' disengagement and dwindling academic performance in Basic Science. According to Nardacchione and Peconio (2022), peer-tutoring strategy transforms classrooms into collaborative spaces where students construct knowledge together, enhancing their critical thinking and problem-solving abilities. This approach is particularly relevant in the Nigerian context, where resource constraints and large class sizes often hinder effective teaching and learning. Empirical evidence has consistently supported the efficacy of peer-tutoring strategy in enhancing students' academic performance across various subjects. Agu and Iwanger (2018) found that peer tutoring significantly improved the achievement of students with learning disabilities in basic science and technology. Similarly, studies

Effect of Peer-Tutoring strategy on Performance in Basic Science Concepts among ... Mamman, G. (2025)

Shamija (2018) and Moliner, and Alegre (2020) reported that, peer tutoring strategy enhanced students' interest and achievement in mathematics and other subjects. These findings align with the findings of Thurston et al (2021) who asserted that peer tutoring facilitates both academic and social benefits of students through collaborative learning. Gender-related differences in academic performance remain a persistent issue in educational research. While some studies, such as those by Iheahurukawa, and Ugwu, (2024) and Okoye et al (2024), reported no significant gender disparities in academic achievement with peer-tutoring strategies, others, like Ezenwosu and Nworgu (2017) and Goulas et al (2024) observed a performance advantage for male students. Understanding these disparities is important for implementing peer-tutoring strategy effectively, ensuring that both male and female students learn equally. Therefore, this study examined the effect of peer-tutoring strategy on the academic performance of Junior Secondary School II students in Basic science concepts in Zaria Education Zone, Kaduna state, Nigeria. The persistent decline in students' performance in Basic Science was a major concern to key stakeholders in Nigerian education system. Despite the subject's critical role in equipping students with the skills and knowledge needed for scientific literacy, many students struggle to grasp its concepts. Traditional teaching methods, characterized by teacher-centered approaches, have been identified as a significant factor contributing to this challenge (Shamija, 2019). These methods often fail to engage students actively, leading to poor academic performance. Peer-tutoring has emerged as a promising strategy to address these issues, offering a learner-centered approach that encourages active participation and collaboration. However, its application in classrooms, particularly in Basic Science, remains underexplored. While studies such as those by Agu and Iwanger (2018); Ebute and Aende (2024) have highlighted the benefits of peer-tutoring in other subjects, there is limited evidence on its impact on Basic Science performance at the Upper Basic level. Understanding how peer-tutoring influences male and female students differently is essential for its effective implementation. Therefore, this study investigates the effectiveness of peer-tutoring teaching method on the performance of Junior Secondary School (II) students in Basic Science concepts, providing insights into its potential to improve learning outcomes and address existing challenges. Conventional teaching method, predominantly lecture-based and focused on rote memorization, have been widely criticized for their ineffectiveness in fostering deep understanding and maintaining students interest in challenging topics like ecology (Anderson, 2023; Jackson, 2022). The conventional method often fails to engage students actively, leading to superficial learning experiences and a lack of practical application of ecological concepts (Smith & Taylor, 2022; Ogunleye & Omotayo, 2022). Hence this consistency use of conventional method results to students' persistence failure in ecology concepts.

Objectives of the study:

The objectives of this study are to:

1. Determine the impact of Peer-tutoring Strategy on the academic performance of JSS students in Basic Science concepts.
2. Determine if Peer-tutoring Strategy will affect disparities among JSS students in their academic performances.

Research Questions:

The following research questions were formulated for this study:

1. How does peer-tutoring Strategy impact on the academic performance of JSS II students in Basic Science?
2. How does peer-tutoring strategy affect the gender disparities among JSS II students in their academic performances?

Hypotheses:

Based on the objectives and research questions stated, the following null hypotheses are formulated for testing at $\alpha \leq 0.05$ level of significance:

H₀₁: There is no significant difference between the mean academic performance scores of JSS II students taught Basic science concepts using Peer-tutoring Strategy and those taught using conventional method.

H₀₂: There is no significant difference between the mean academic performance scores of male and female JSS II students taught using Peer-tutoring Strategy.

Methodology

The study employed a pre-test, post-test quasi-experimental design, specifically the non-equivalent control group design. According to Best and Kahn (2014), a Quasi-Experimental Design is often used in classroom experiments and does not involve the random assignment of subjects. This study involved two groups: an experimental and a control group. The design included two groups; an experimental group exposed to the peer-tutoring strategy and a control group taught using conventional methods. Pre-tests and post-tests were administered to both groups to measure differences in academic performance. The population consisted of 18,508 JSS II students from 28 co-educational schools offering Basic Science in Zaria Education Zone, Kaduna state, Nigeria. A sample was selected using 125 students was selected using purposive and simple random sampling techniques. Intact classes were used to maintain the natural learning environment. The instruments included the Basic Science Concepts

Effect of Peer-Tutoring strategy on Performance in Basic Science Concepts among ... Mamman, G. (2025)

Performance Test (BSCPT), developed to align with the Basic Science curriculum, and validated by experts in Science Education. The reliability coefficient of 0.81 was established using the Kuder-Richardson formula. The experimental group was taught using the peer-tutoring strategy, which involved students in pairs or small groups, where peers facilitated learning under the teachers' supervision. The control group were taught using conventional methods. Both groups were taught for a period of six weeks, where posttest was administered to the groups to determine the effect of the two instructional strategies on students' academic performance in Basic science concepts. Descriptive statistics (mean and standard deviation) were used to answer the research questions, while inferential statistics (Independent sample t-test) was used to test the null hypotheses at $P \leq 0.05$ level of significance.

Presentation of Results

Research Question 1

How does peer-tutoring Strategy impact on the academic performance of JSS II students in Basic Science?

Table 1: Mean and Standard Deviation Analysis for Experimental and Control Groups

Variable Name	N	Mean	Std. Deviation	Mean Difference
Experimental	65	35.67	1.21	6.35
Control	60	29.32	3.26	

Researcher's fieldwork

Table 1 shows that the mean difference exist between the mean academic performance scores of JSS II students taught Basic Science Concepts using Peer-tutoring strategy and their counterparts taught using Conventional method. The computed mean academic performance scores of students in the experimental and control groups are 35.67 and 29.32 respectively with a mean difference of 6.35 in favour of the experimental group. To find out whether significance difference exist or not, null hypothesis one was tested.

Research Question 2

How does peer-tutoring strategy affect the gender disparities among JSS II students in their academic performances?

Table 2: Mean and Standard Deviation Analysis for Experimental and Control Groups

Variable Name	N	Mean	Std. Deviation	Mean Difference
Experimental	33	40.22	6.03	-0.02
Control	32	40.24	5.97	

Researcher's fieldwork

Table 2 shows that there is no significant difference between the descriptive mean performance score of male and female JSS II students taught Basic science Concepts using Peer-tutoring strategy. The computed mean performance scores male and female students in the experimental and control groups are 40.22 and 40.24 respectively and a standard deviation of 6.03 and 5.79 with a mean difference of -0.02. This shows that both male and female students have the same level of mean performance when taught Basic science concepts using Peer-tutoring strategy. To find out whether significance difference exist or not, null hypothesis two was tested.

Hypothesis 1

There is no significant difference between the mean academic performance scores of JSS II students taught Basic science concepts using Peer-tutoring strategy and their counterparts taught using Conventional method. Null hypothesis was tested using independent sample t-test and the result is presented in Table 3 below:

Table 3: Provide a Simple Descriptive Title for the Table

Group	n	Mean	Std. Deviation	Mean Difference	df	t-computed	P	Decision
Experimental	65	35.65	1.21	6.35	123	33.12	0.000	Significant
Control	66	29.32	3.26					

Significant at $p \leq 0.05$ level

Effect of Peer-Tutoring strategy on Performance in Basic Science Concepts among ... Mamman, G. (2025)

Table 3; Result of the independent t-test statistic shows that significance difference exist between the mean academic performance scores of Upper basic II students taught Basic science concepts using Peer-tutoring strategy and their counterparts taught using Conventional method. Reasons being that, the calculated p-value of 0.00 is lower than the 0.05 alpha level of significance and the computed t-value of 33.12 at degree of freedom of 123. The computed mean academic performance scores are 35.65 and 29.32 respectively with a mean difference of 6.35. Therefore, the null hypothesis which states that there is no significant difference between the mean academic performance scores of JSS II students taught Basic science concepts using Peer-tutoring strategy and their counterparts taught using Conventional method, is hereby rejected.

Hypothesis 2

There is no significant difference between the mean academic performance scores of male and female JSS II students taught Basic science concepts using Peer-tutoring strategy. Null hypothesis was tested using independent sample t-test and the result is presented in Table 4 below:

Table 4: Provide a Simple Descriptive Title for the Table

Group	n	Mean	Std. Deviation	Mean Difference	df	t-computed	P	Decision
Experimental	33	40.22	6.03			-0.12	0.41	Not Significant
Control	32	40.24	5.79	-0.02	53			

Not Significant at $p \leq 0.05$ level

Table 4 shows that that the calculated p-value of 0.41 is greater than the 0.05 alpha level of significance with the computed t-value of -0.12 at degree of freedom of 53. The computed mean academic performance scores of Male and female JSS II students taught Basic science concepts using Peer-tutoring strategy are 40.22 and 40.24 respectively with a mean difference of -0.02. This shows that both male and female students have the same level of mean academic performance scores when taught Basic science concepts using Peer-tutoring strategy. Therefore, the null hypothesis which stated that there is no significant difference between the mean academic performance scores of male and female JSS II students taught Basic science concepts using Peer-tutoring strategy, is hereby accepted and retained.

Discussion of Findings

The result in Table 2 shows that students in the experimental group had a higher mean academic performance score than those in the control group. The difference was significant as indicated by the t-test analysis. This revealed that students taught Genetics concepts with peer-tutoring strategy had a significantly higher mean academic performance scores than those taught using Conventional Method. By implication, the peer-tutoring strategy was able to foster a significantly higher performance than the conventional Method. The significant difference implies rejection of null hypothesis and retaining alternate hypothesis. Therefore, null hypothesis that states that, there is no significant difference in the mean academic performance scores of Upper Basic II students taught Basic science concepts with Peer-tutoring strategy and their counterparts taught using Conventional method is rejected. The significant difference indicates that students in experimental group recorded the higher mean score than those in the control group. This finding of this study supports that of Agu and Iwanger (2018) which revealed that students exhibited significant improvements in performance as a result of treatment with Peer-tutoring strategy as compared to the conventional method. Similarly, studies Shamija (2018); Moliner, and Alegre (2020) reported that, peer tutoring strategy enhanced students' interest and achievement in mathematics and other subjects. The findings of this study also are in agreement with findings of Thurston, et al (2021) who asserted that effective use of peer tutoring strategy in teaching should be employed as it will enhance student's performance. It was revealed in Table 4 that no significant difference in the performance of male and female students when exposed to Peer-tutoring strategy. This showed that the use of Peer-tutoring strategy is gender inclusive in the academic performance of JSS II students in Basic Science. This is in consistence with the findings of Iheahurukawa, and Ugwu, (2024) and Okoye, et al (2024), who found no significant gender disparities in academic achievement with peer-tutoring strategies. The findings in this study is in disagreement with the findings of Ezenwosu and Nworgu (2017) and Goulas et al (2024) that had earlier observed academic performances advantages for males students over females.

Conclusion

The study established that the use of peer-tutoring strategy significantly improves the academic performance of JSS II students in Basic Science concepts. Peer-tutoring strategy promotes meaningful and concrete learning among Basic science students

Effect of Peer-Tutoring strategy on Performance in Basic Science Concepts among ... Mamman, G. (2025)

as it allows room for interaction among students. Peer-tutoring strategy is gender-friendly as it boosts academic performance among both male and female students as it promotes collaboration, and improves social interactions among students.

Recommendations

1. Basic science teachers should incorporate peer-tutoring strategy into JSS pedagogy as it fosters active participation among students and enhance academic performance in Basic Science.
2. Curriculum planners should integrate activities that involve peer-tutoring strategy into the Basic Science curriculum to promote student-centered learning.
3. Textbook authors should include peer-tutoring methodologies to guide teachers and students.
4. The Federal and State Governments through the Ministries of Education should organize training and retraining workshops for Basic science teachers on the use of peer-tutoring strategy.
5. Professional Associations like the Science Teachers Association of Nigeria (STAN) and research centers such as Nigerian Educational and Research Development Council (NERDC) should incorporate v in their science curricular at secondary school level to encourage the use of the strategy among teachers. They should also organize workshops and seminars on how to use peer-tutoring strategy to teach specific Basic science.

References

- Agu, P. A., & Iwanger, R. (2018). Effect of peer tutoring instructional strategy on achievement of Basic Science and Technology students with learning disabilities in Nasarawa State, Nigeria. *East African Scholars Journal of Education, Humanities and Literature*, 1(2), 47-54.
- Ashlame, P., & Iwanger, R. (2018). Peer tutoring instructional strategy and its impact on students' academic performance. *East African Scholars Journal of Education, Humanities and Literature*, 1(2), 47-54.
- Ayashagba, T. (2017). Effect of discussion method on students' interest and achievement in social studies in education zone 'B' of Benue State. Unpublished M.Ed. dissertation, Benue State University, Makurdi.
- Ebute, E. M., & Aende, T. F. (2024). Effects of peer-tutoring strategy on Upper Basic Two students' interest and achievement in social studies. *International Academy Journal of Administration, Education and Society*, 6(3), 113-125.
- Federal Republic of Nigeria (FRN). (2014). National policy on education (6th ed.). Lagos: NERDC Press.
- Gbordzoe, L. (2020). Assessing the effect of mode of instruction on the academic performance of students in North Tongu District (Doctoral dissertation, University of Education, Winneba).
- Goulas, S., Griselda, S., & Megalokonomou, R. (2024). Comparative advantage and gender gap in STEM. *Journal of Human Resources*, 59(6), 1937-1980.
- Iheahurukawa, N. J., & Ugwu, A. N. (2024). Effect of peer-tutoring strategy on the academic achievement of secondary school students in electro chemistry in Imo state. *Irish journal of educational practice*, 7(1), 13-24.
- Ishaya, E. (2014). Impact of instructional materials on students' achievement and interest in social studies at the upper basic education schools level in Obi local government area of Nassarawa State. Unpublished M.Ed. dissertation, Benue State University, Makurdi.
- Moliner, L., & Alegre, F. (2020). Effects of peer tutoring on middle school students' mathematics self-concepts. *Plos one*, 15(4), e0231410.
- Moreno, C., & Duran, D. (2002). *Frameworks: Cooperative and collaborative methods*. Barcelona, Spain: Edebe.
- Nardacchione, G., & Peconio, G. (2022). Peer Tutoring and Scaffolding Principle for Inclusive Teaching. *Elementa. Intersections between Philosophy, Epistemology and Empirical Perspectives*, 1(1-2), 181-200.
- National Teachers Institute. (2019). *Manual for the re-training of primary school teachers (Social Studies)*. Kaduna: NTI Press.
- Okoye, A. A. (2017). Effect of peer-tutoring method on students' academic achievement in home economics. *Academic Journal of Interdisciplinary Studies*, 2(5), 193-197.
- Okoye, C. C., Ikwuka, O. I., & Akudolu, L. R. (2024). Differential effect of peer tutoring and gender on secondary school students 'academic achievement in English language in Anambra state, Nigeria. *UNIZIK Journal of Educational Research and Policy Studies*, 18(1), 130-137.
- Shamija, T. A. (2019). *Social studies education: An introductory text (Revised edition)*. Makurdi: Selfers Academic Press.
- Shubeck, K. T. (2022). Student Prior Knowledge and Learning in an Intelligent Tutoring System: Comparing the Effectiveness of Vicarious and Interactive Dialogues. The University of Memphis.

DOI: <https://doi.org/10.64348/zije.202551>

Effect of Peer-Tutoring strategy on Performance in Basic Science Concepts among ... Mamman, G. (2025)

Thurston, A., Cockerill, M., & Chiang, T. H. (2021). Assessing the differential effects of peer tutoring for tutors and tutees. *Education Sciences*, 11(3), 97.

Whitman, N. A. (2012). *Peer teaching: To teach is to learn twice*. Washington, DC: ERIC Clearinghouse on Higher Education.