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Effect of Peer-Assisted Learning Strategy on Academic Performance and Interest among Senior Secondary School Biology Students in Batagarawa, Katsina State, Nigeria

Safiyanu Musa[1]*, Usman Lukuman Adedayo[2], Abdullahi Ibrahim[2]

[1]Institute of Education, Ahmadu Bello University, Zaria, Kaduna State, Nigeria

[2]Department of Educational Foundations and Curriculum, Ahmadu Bello University, Zaria

***Corresponding author:** safiyanumusa74@gmail.com

Abstract

This study investigated the effect of Peer-Assisted Learning (PAL) Strategy on academic Performance and interest among Senior Secondary School Biology students in Batagarawa, Katsina State. Two objectives, Two research questions and two hypotheses were formulated to guide the study, some of the objectives include: Determine the effect of Peer-Assisted Learning Strategy on students' academic Performance in Biology compared with those taught using the conventional teaching method in senior secondary schools in Batagarawa, Katsina State. The study adopted quasi-experimental design using pre-test, post-test and non-equivalent control group. The population of the study comprised 3,839 Senior Secondary School students in eight public senior secondary schools in Batagarawa Local Government Area. A sample of 120 SS II Biology students was selected from two public senior secondary schools using purposive and intact-class sampling techniques. The instruments used for data collection were the Biology Performance Test (BAT) and Biology Interest Inventory Checklist (BIIC). The instruments were validated by experts in Biology Education and Educational Measurement and Evaluation. A pilot study was conducted at Government Day Senior Secondary School, Abukur, using the test-retest method. The reliability coefficients obtained using Pearson Product Moment Correlation Coefficient were 0.86 for the BAT and 0.84 for the BIIC. The data collected were analysed using mean and standard deviation to answer the research questions, while independent samples t-test was used to test the null hypotheses at 0.05 alpha level of significance. The findings revealed that students taught using the Peer-Assisted Learning Strategy recorded a higher mean interest score of 84.60 compared with 74.80 for students taught using the conventional teaching method. Similarly, students exposed to PAL obtained a higher mean academic Performance score of 81.90 compared with 71.60 for those taught using the conventional method. The study concluded that Peer-Assisted Learning Strategy was effective in enhancing students' interest and academic Performance in Biology and provided comparable learning opportunities for students. It was therefore recommended that Biology teachers should incorporate Peer-Assisted Learning Strategy into classroom instruction to promote active participation, interaction, interest and improved academic Performance among students.

Keywords: peer-assisted, learning strategy, academic performance, interest, biology

1 Introduction

Poor academic Performance and low interest among students in Biology have continued to be major concerns to teachers, parents, school administrators and other education stakeholders. Biology is an important science subject at the senior secondary school level because it provides learners with fundamental knowledge of living organisms, their structures, functions, interactions and relationships with the environment. It also serves as an important foundation for students who intend to pursue careers and programmes such as medicine, pharmacy, nursing, agriculture, environmental science, biotechnology and other health- and science-related disciplines. Despite its importance, students' Performance in Biology has continued to attract the attention of researchers because a number of factors associated with teaching, learning, motivation and instructional methods can influence students' performance. For instance, Akuche and Babatunde (2021) reported that teachers' characteristics significantly influenced students' academic Performance in Biology, indicating that the quality and nature of classroom instruction are important considerations in improving learning outcomes. Similarly, Nwosu and Samuel (2022) found that Performance motivation and self-concept were significantly related to students' academic Performance in Biology. These findings suggest that improving students' Biology Performance requires instructional approaches that can promote active participation, motivation, interaction and meaningful engagement with learning activities.

Transport System in Mammals often require students to connect scientific ideas with observations, experiments, previous knowledge and real-life experiences. A constructivist classroom therefore encourages students to participate actively in learning through questioning, experimentation, problem-solving, discussion and practical activities. Rather than merely memorizing definitions and scientific facts, students are expected to examine biological phenomena, exchange ideas and develop meaningful explanations. Such active participation can assist students in correcting misconceptions and developing a more lasting understanding of difficult Biology concepts, thereby contributing to improve academic Performance and greater interest in the subject.

Similarly, peer teaching is strongly supported by the principles of Social Constructivist Theory by Vygotsky, (1978) who emphasised the important role of social interaction, language and collaboration in cognitive development. Unlike approaches that focus mainly on individual learning, social constructivism explains that knowledge can be developed through interaction with teachers, peers and other members of society. Vygotsky argued that learners can achieve a higher level of understanding when they receive appropriate guidance and support from more knowledgeable individuals. A major concept associated with the theory is the Zone of Proximal Development, which refers to the difference between what a learner can accomplish independently and what the learner can achieve with appropriate assistance from a teacher, peer or other knowledgeable person. This perspective suggests that learning is enhanced when students interact, exchange ideas and receive support that enables them to perform tasks or understand concepts that may initially be difficult.

One instructional approach that has attracted considerable attention is peer-assisted learning (PAL). Peer-assisted learning is an instructional arrangement in which students support one another in the learning process through structured interaction, explanation, discussion, questioning, feed-back and shared academic activities. It may involve different forms of peer interaction, including peer tutoring and reciprocal peer tutoring, in which students can take the roles of tutors and learners at different stages of the instructional process. The approach is based on the understanding that students can learn effectively from one another when they are provided with appropriate opportunities and structured learning activities. Recent research has shown that peer-assisted learning can also take place through both face-to-face and technology-supported interaction. A study of Nwosu and Samuel (2022), on integrated peer-assisted learning among Nigerian university students found that students participated in peer-assisted learning through different modes of interaction, with social media emerging as an important means of peer communication and learning. This demonstrates the increasing relevance of peer interaction as a means of supporting students' learning and academic engagement. These processes can increase participation and make learning activities more engaging. Recent evidence from Wati and Siregar (2024) also showed that a peer-tutor cooperative model could improve students' interest in learning Mathematics. Although the study was conducted in Mathematics rather than Biology, its finding is relevant because it demonstrates the potential of peer-based learning arrangements to influence students' affective engagement with academic subjects.

The strategy can also provide opportunities for students to learn at different levels because stronger learners can support those experiencing difficulties while tutors themselves consolidate their knowledge through teaching others. Recent Nigerian studies have continued to support this position. Balogun (2025) established that peer tutoring significantly improved Biology Performance, while Abdulrahman (2024) demonstrated its relevance to both Biology performance and students' interest. The study seeks to determine whether exposure to peer-assisted learning can produce better academic Performance and greater interest in Biology compared with students taught using the conventional approach. The study is considered important because the findings may provide Biology teachers with empirical evidence on the usefulness of a learner-centred strategy that encourages interaction, participation, cooperation and shared responsibility for learning. It may also contribute to the growing body of recent empirical literature on peer-assisted learning and provide evidence that could assist teachers, school administrators, curriculum planners and other education stakeholders in improving the teaching and learning of Biology in secondary schools.

1.1 Objectives of the Study

The objectives of the study are as follows:

1. determine the effect of Peer-Assisted Learning Strategy on students' interest in Biology compared with those taught using the conventional teaching methods in senior secondary schools in Batagarawa, Katsina State and
2. determine the effect of Peer-Assisted Learning Strategy on students' academic Performance in Biology compared with those taught using the conventional teaching methods in senior secondary schools in Batagarawa, Katsina State.

1.2 Research Questions

The following research questions guided the study:

1. What is the effect of Peer-Assisted Learning Strategy on students' interest in Biology compared with those taught using the conventional teaching methods in senior secondary schools in Batagarawa, Katsina State?
2. What is the effect of Peer-Assisted Learning Strategy on students' academic Performance in Biology compared with those taught using the conventional teaching methods in senior secondary schools in Batagarawa, Katsina State?

1.3 Hypotheses

The following null hypotheses were tested at 0.05 alpha level of significance

H_{01}: There is no significant difference between the posttest mean interest scores of students taught using Peer-Assisted Learning Strategy and those taught using the conventional teaching methods in Biology in Batagarawa, Katsina State.

H_{02}: There is no significant difference between posttest mean academic Performance scores of students taught using Peer-Assisted Learning Strategy and those taught using the conventional teaching methods in Biology in Batagarawa, Katsina State.

2 Methodology

The study adopted quasi-experimental research design using post-test and non-equivalent control group design, two intact classes were used, with one group serving as the experimental group and the other as the control group. The population of the study comprised 1, 179 Senior Secondary School students two (SS2) enrolled in the eight public senior secondary schools located within Batagarawa, Katsina State.

A sample of two intact classes comprised of 120 SS II Biology students were selected from two public senior secondary schools in Batagarawa Local Government Area. The sample comprised 35 male and 25 female students from one intact class of Government Pilot Day Senior Secondary School Dabaibayawa, 32 male and 28 female students from one intact class of Government Day Senior Secondary School, Batagarawa. The two schools were selected.

The instruments used for data collection in this study were the Biology Performance Test (BPT) and the Biology Interest Inventory Checklist (BIIC). The Biology Performance Test was used to collect data on students' academic Performance in Biology, while the Biology Interest Inventory Checklist was used to determine students' levels of interest in Biology before and after the instructional treatment. The use of these two instruments was considered appropriate because the study investigated the effect of peer-assisted learning on students' academic Performance and interest in Biology.

The Biology Performance Test (BPT) consisted of 20 objective test items drawn from selected concepts under the topic "Transport System in Mammals" in the Senior Secondary School II (SS II) Biology curriculum. The test items were adapted from relevant WAEC and NECO past examination questions to ensure that they were related to the prescribed Biology curriculum and were appropriate for assessing students' understanding of the selected concepts. The BPT was administered to both the experimental and control groups as a pre-test before the commencement of the treatment and as a post-test after the treatment to determine changes in students' academic Performance following their exposure to peer-assisted learning and the conventional teaching methods.

The Biology Interest Inventory Checklist (BIIC) was used to collect data on students' levels of interest in Biology. The checklist contained statements designed to measure students' interest in areas such as willingness to participate in Biology lessons, enjoyment of Biology learning activities, attention during lessons, willingness to study Biology, confidence in participating in classroom activities, and preference for Biology-related tasks. The students were required to indicate their responses to the statements based on the response options provided in the checklist. The BIIC was administered to both the experimental and control groups before and after the treatment to determine their initial and subsequent levels of interest in Biology. This procedure enabled the researcher to determine whether exposure to the peer-assisted learning strategy produced any significant changes in students' interest in Biology independently of their academic Performance.

The two instruments were validated by 3 experts in the Department of Science Education, Umaru Musa Yaradua University, Katshina with specialization in Biology Education, and experts in Educational Measurement and Evaluation, and necessary modifications were made before the administration of the instruments. The experts examine the relevance and appropriateness of the Biology content and test items, as well as experts in Educational Measurement and Evaluation, who were examine the adequacy of the test items, response format, language, clarity, and suitability of the instruments for measuring students' academic Performance and interest. Their observations, corrections, and suggestions were carefully considered, and the necessary modifications were made before the instruments are administered for the study.

A pilot study was conducted at Government Day Senior Secondary School, Abukur, and the reliability coefficients obtained were 0.86 for the BAT and 0.84 for the BIIC, indicating that both instruments were sufficiently reliable for the study.

The data was collected using Biology Performance Test (BPT) and Biology Interest Inventory Checklist (BIIC) in both the experimental and control groups. The experimental group was taught Transport System in Mammals using the Peer-Assisted Learning strategy, while the control group was taught the same topic using the conventional teaching methods. Before the treatment, both groups were administered the Biology Performance Test (BAT) and Biology Interest Inventory (BII) as pre-tests to determine their initial levels of academic Performance and interest in Biology

The data collected from the study were analyzed using descriptive and inferential statistics. The research questions were answered using mean and standard deviation to describe the level of students' interest and academic performance. The null hypotheses were tested using the independent samples t-test at a 0.05 level of significance

3 Results

Research Question One: What is the effect of Peer-Assisted Learning Strategy on students' interest in Biology compared with those taught using the conventional teaching methods in senior secondary schools in Batagarawa, Katsina State?

Table **1**

Mean and Standard Deviation of Students' Interest in Biology between PAL and Conventional Teaching Groups

Group	N	Mean	Sd.	Mean Difference
PAL Experimental Group	60	84.60	5.82	
				9.80
Conventional Teaching Group	60	74.80	6.14	

Table 1 shows that students taught Biology using the Peer-Assisted Learning Strategy obtained a mean interest score of 84.60 with a standard deviation of 5.82, whereas students taught using the conventional teaching methods obtained a mean score of 74.80 with a standard deviation of 6.14. The mean difference of 9.80 indicates that the PAL group recorded a higher level of interest in Biology than the conventional teaching group. This suggests that participation in peer-assisted learning activities was associated with greater interest in Biology among the students.

Research Question Two: What is the effect of Peer-Assisted Learning Strategy on students' academic Performance in Biology compared with those taught using the conventional teaching methods in senior secondary schools in Batagarawa, Katsina State?

Table **2**

Mean and Standard Deviation of Academic Performance between PAL and Conventional Teaching Groups

Group	N	Mean	Sd.	Mean Difference
PAL Experimental Group	60	81.90	6.25	
				10.30
Conventional Teaching Group	60	71.60	6.82	

Table 2 reveals that students taught Biology using the Peer-Assisted Learning Strategy obtained a mean academic Performance score of 81.90 with a standard deviation of 6.25, while students taught using the conventional teaching methods obtained a mean score of 71.60 with a standard deviation of 6.82. The mean difference of 10.30 indicates that students in the PAL group recorded a higher mean academic Performance score than students in the conventional teaching

group. The result therefore suggests a positive difference in academic Performance in favour of the students exposed to Peer-Assisted Learning Strategy.

Hypothesis One

H_{01}: There is no significant difference between the post-test mean interest scores of students taught using Peer-Assisted Learning Strategy and those taught using the conventional teaching methods in Biology in Batagarawa, Katsina State?

Table **3**

Independent Samples t-test Analysis of Students' Interest in Biology

Group	N	Mean	Sd.	t-value	df	p-value	Remark
Peer-Assisted Learning	60	84.60	5.82				
				9.2	118	0.001	Rejected
Conventional Teaching	60	74.80	6.14				

Table 3 shows that students taught using the Peer-Assisted Learning Strategy obtained a mean interest score of 84.60 with a standard deviation of 5.82, while those taught using the conventional teaching methods obtained a mean score of 74.80 with a standard deviation of 6.14. The calculated *t*-value of 9.2 with 118 degrees of freedom yielded a *p*-value of 0.001, which is less than the 0.05 level of significance. Therefore, the null hypothesis was rejected. This indicates that there was a statistically significant difference in the interest of students taught Biology using the Peer-Assisted Learning Strategy and those taught using the conventional teaching methods.

Hypothesis One

H_{02}: There is no significant difference between post-test mean academic Performance scores of students taught using Peer-Assisted Learning Strategy and those taught using the conventional teaching methods in Biology in Batagarawa Local Government Area.

Table **4**

Independent Samples t-test Analysis of Students' Academic Performance in Biology by Group

Group	N	Mean	Sd.	t-value	df	p-value	Remark
Peer-Assisted Learning	60	81.90	6.25				
				9.01	118	0.000	Rejected
Conventional Teaching	60	71.60	6.82				

Table 4 reveals that students taught using the Peer-Assisted Learning Strategy recorded a mean academic Performance score of 81.90 with a standard deviation of 6.25, while students taught using the conventional teaching methods recorded a mean score of 71.60 with a standard deviation of 6.82. The calculated *t*-value of 9.01 with 118 degrees of freedom produced a *p*-value of 0.000, which is less than the 0.05 level of significance. Therefore, the null hypothesis was rejected. This indicates that there was a statistically significant difference in the academic Performance of students taught Biology using the Peer-Assisted Learning Strategy and those taught using the conventional teaching methods.

4 Discussion of Findings

The finding from the research question number one revealed that students taught Biology using the Peer-Assisted Learning Strategy recorded a higher mean interest score of 84.60, compared with 74.80 obtained by students taught using the conventional teaching methods. The mean difference of 9.80 indicates a higher level of interest among students exposed to Peer-Assisted Learning. The finding suggests that PAL can create a more interactive and participatory learning environment in which students have opportunities to communicate, exchange ideas, explain concepts to their peers and participate actively in Biology lessons. The interactive nature of the strategy may make learning activities more engaging and reduce students' passive dependence on teacher explanations. This The finding is consonant with the findings of Awofola and Agbolade (2024)**,** who reported positive learning outcomes from peer-assisted learning approaches and emphasized the value of peer interaction in improving students' learning experiences. Similarly, Ehirheme and Eze (2021) found that peer tutoring and peer-led team learning produced positive effects on students' Biology Performance, demonstrating the

usefulness of peer interaction in Biology instruction. Abdulrahman, (2024), reported that students taught Biology through reciprocal peer tutoring strategy performance and interest in Life Organization demonstrated improved interest and academic Performance compared with students taught using conventional teaching methods. These findings support the present study by indicating that structured peer interaction, collaborative learning and peer tutoring can enhance students' engagement, interest and academic Performance in Biology.

The agreement between these previous findings and the present study indicates that peer-assisted approaches can provide learners with greater opportunities to become actively involved in the learning process. In the present study, students exposed to PAL were able to interact with their peers during learning activities, which may have increased their willingness to participate and sustain attention during Biology lessons. The finding is also supported by Okigbo and Orah (2026), who reported that reciprocal peer tutoring had a positive influence on students' interest in Biology. Similarly, Ikechukwu and Oyovwi (2025) reported differences in students' Performance and attitude toward Biology following exposure to peer tutoring, further indicating the potential of peer-oriented strategies to influence students' engagement with Biology. Therefore, the present finding suggests that PAL can be useful in creating an engaging Biology classroom in which students have opportunities to learn through interaction and cooperation with their classmates.

The finding from Research Question two revealed that students taught Biology using the Peer-Assisted Learning Strategy obtained a higher mean academic Performance score of 81.90, compared with 71.60 obtained by students taught using the conventional teaching methods. The mean difference of 10.30, with the statistically significant *t*-test result ($t = 9.01$, $p = 0.000$), indicates a significant difference between the two groups. The finding suggests that PAL provided learning experiences that enhanced students' understanding and Performance in Biology. Through peer interaction, students can explain concepts to one another, receive immediate clarification, compare their understanding with that of their peers and participate actively in solving learning tasks. This finding is consistent with Etobro and Fabinu (2018), who reported positive effects of peer-assisted learning strategies on students' academic performance in Basic Science. It also agrees with Collins (2020), who found that peer tutoring and peer-led team learning positively influenced students' Performance in Biology.

The present finding is further supported by Kareem and Iwuala (2025), who investigated peer tutoring among Senior Secondary School Biology students and reported positive Performance outcomes associated with peer tutoring. In addition, Kalu-Uche, and Ogbonna, (2021), reported that students exposed to peer tutoring in Biology achieved better learning outcomes than those taught through conventional approaches. These findings indicate that peer interaction can facilitate students' understanding of scientific concepts and contribute to improve academic Performance. Recent Nigerian evidence further supports the present result. Balogun (2025) found that secondary school students taught Biology through peer tutoring demonstrated improved Biology Performance compared with students in the comparison group. Similarly, Okigbo and Orah (2026) reported significantly higher Biology Performance among students taught through peer tutoring than those taught through the lecture methods. These studies closely support the present finding and suggest that peer-assisted instructional approaches can provide students with opportunities for active participation, peer explanation and collaborative problem-solving, which may contribute to improve academic Performance in Biology.

5 Conclusion

Based on the findings of the study, the study concluded that Peer-Assisted Learning Strategy is associated with higher levels of students' interest in Biology compared to conventional teaching methods. Students exposed to PAL recorded a higher mean interest score, suggesting that opportunities for peer interaction, discussion, explanation and collaborative learning can contribute to students' engagement with Biology. The study also concluded that students exposed to Peer-Assisted Learning Strategy recorded higher academic Performance scores than students taught using the conventional teaching methods. The difference in the mean scores suggests that peer-assisted activities can provide students with opportunities to clarify concepts, exchange ideas, practice academic tasks and learn from one another.

6 Recommendations

Based on the findings of the study, the following recommendations were made:

1. Biology teachers should incorporate Peer-Assisted Learning Strategy into Biology instruction to promote students' interest in the subject.

2. Secondary school Biology teachers should use Peer-Assisted Learning Strategy as a complementary instructional approach for improving students' academic Performance in Biology.
3. School administrators and Biology teachers should ensure that PAL activities are designed to for improving students' academic Performance in Biology. .

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