Published by

British Journal of Contemporary Research

BEXFORD PUBLISHING

Group Learning Strategy and Classroom Activities as Determinants of Academic Performance among Basic 8 Science Students in Makurdi Metropolis

Original Research Article | Volume 1 | Issue 6 | 2026 | Article Number: 069

Accepted: 30 October 2026 | Published: 10 November 2026 | ISSN: 2979-8582 (Online)

Crossref : **https://doi.org/10.67693/BJCR-95W9ZADB**

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Abstract

This study investigated the effect of group learning strategy with classroom activities on the academic performance of Basic 8 students in Basic Science in Makurdi Metropolis, Benue State. The study adopted a quasi-experimental pretest–posttest design without random assignment. A sample of 150 Basic 8 students were selected from a population of approximately 20,000 students in 30 secondary schools using multistage sampling. The participants were assigned to three groups of 50 students each: Group Learning Strategy (GLS), Group Learning Strategy with Classroom Activities (GLS+CA), and conventional lecture method. Data was collected using the Basic Science Performance Test (BSPT), which had a reliability coefficient of 0.82 using KR-21. Mean and standard deviation were used to answer the research questions, while Analysis of Covariance (ANCOVA) was used to test the hypotheses at the 0.05 significance level. Results showed that GLS recorded a mean gain of 8.46, GLS+CA 8.40, and lecture method 7.12. ANCOVA revealed a significant difference among the instructional strategies, $F(2,146) = 9.649$, $p < .001$, $\eta^2p = .117$. Gender had no significant influence on performance under GLS, $F(1,47) = 3.710$, $p = .060$. The study concluded that group learning strategies are more effective than conventional instruction and are gender-inclusive. It recommends their adoption in Basic Science teaching.

Keywords: Basic Science, Group Learning Strategy, Classroom Activities, Academic Performance, Gender, Junior Secondary Education, Nigeria

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INTRODUCTION

Science education holds a vital role in national development by promoting technological advancement, economic growth, and scientific literacy. It provides the foundation for producing skilled professionals such as scientists, technologists, technicians, and artisans needed for sustainable development. Studies have emphasized that science and technology contribute significantly to solving societal challenges in areas such as health, agriculture, transportation, security, and communication, making quality science education essential for national progress (Atoo, 2018; Tofi, et al, 2017). Furthermore, advances in science and technology have transformed teaching and learning beyond the traditional classroom, while countries that prioritize science education have achieved greater technological and economic development (Okwara, et al, 2019; Adejoh, et al, 2013).

Despite its importance, the academic performance of students in Basic Science in Nigeria remains unsatisfactory, raising concerns about the effectiveness of existing instructional methods. The poor performance undermines the objective of science education, as Basic Science serves as the foundation for advanced science learning. The analysis of students' performance released by Benue State Examinations Board (2023) revealed that in 2023, 78, 960 candidates took the examination 22,260 (28, 19 %) had distinction, 39, 647 (50.21%) had credit, 9,418 (11.93%) has pass and 7,635 (9.67%) failed. The performance in the subject is not good enough to boast of as a foundation subject upon which pure science at senior secondary school and science education generally anchored on, indicating the need for improved teaching strategies. Consequently, innovative instructional approaches such as group learning and structured classroom activities have been recommended to promote active participation, improve conceptual understanding, and enhance students' academic achievement.

The status of the performance in Basic Science and Technology according to Okwara et al (2019) is attributed to inadequate exposure of students to class activity, inadequate preparation by teachers and students, inability to comprehend questions, lack of qualified Basic Science and Technology teachers and inability to effectively implement Basic Science and Technology Curriculum. While, Adeniran, et al, (2018), affiliate the low performance in the Basic Science subject to teachers incompetence, inadequate infrastructure and materials for teaching and learning the subject, poor student background, poor funding of science and technology education, lack of awareness by most parents, lack of motivation on both teacher and students and poor management by various heads of institution among others. Similarly, (Fatoki et al., 2026a), identify that Basic Science students' academic performance in the subject has remained a major concern in many Nigerian secondary schools. Several factors have been pointed as contributing to this challenge, including inability of teachers to adopt group learning strategies inadequate instructional materials, poor classroom interaction, limited learner engagement, and failure to relate scientific concepts to learners' cultural experiences

The government on their part have implemented several measures to improve the quality of science education, including curriculum reforms, the provision of laboratory equipment, teacher training, and the promotion of innovative instructional approaches such as group learning and classroom activities. Educational reforms have also encouraged the integration of digital technologies, multimedia tools, and mentorship programmes to enhance students' interest and participation in science. However, the effectiveness of these initiatives is constrained by inadequate infrastructure, overcrowded classrooms, limited instructional resources, and resistance to adopting new teaching methods. These challenges highlight the need for greater investment in educational facilities, qualified teachers, and continuous professional development.

Fatoki et al. (2026b) further observed that meaningful Basic Science education should enable students to

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connect scientific concepts with their everyday experiences, thereby making learning more relevant and functional to the society. Basic Science should be taught using learner-centred, activity-based approaches that promote inquiry, collaboration, and practical experiences rather than rote memorization (Ityokyaa & Adejoh, 2014). Despite its importance as the foundation of scientific literacy, students' performance in Basic Science remains unsatisfactory due to ineffective teaching methods and low student engagement. The Benue State Examinations Board (2023) reported that fewer than 30% of candidates obtained distinctions in the Basic Science examination, indicating persistent learning gaps. Consequently, the adoption of group learning strategies and classroom activities offers a promising approach to improving students' understanding, critical thinking, retention, and overall academic achievement by creating a more interactive and engaging learning environment.

Group learning is a learning strategy that organizes students in small groups so that they can work together to maximize the learning of others. In particular, the group learning approach is the situation where students are organized in pairs or in small groups to help each other in learning the assigned material (Ajaja & Eravwoke, 2012 as cited in Fatoki et al 2026). Gambari, et al, (2016), also defined group learning as a way of learning in which students of different ability levels work together in small group to achieve a goal. It involves the use of a variety of learning activities to improve the understanding of a topic. Students in a group interact with each other, share ideas and information, seek for additional information and make decisions about their discoveries to the entire class. There are four Basic elements in the group learning strategy. These basic elements include; small groups must be structured for positive interdependence, there must be face to face interactions, individual responsibility and use of interpersonal skills and small groups. It is known that group learning actively involves students in the learning process and seeks to improve the critical thinking, reasoning and problem solving skills of the learner (Ajaja & Mezieobi, 2018). The use of group learning strategy may have the same or different effect on male and female students.

Classroom activities are an important part of the teaching and learning process because they actively involve students in applying what they have learned in class. These activities, which include observation, investigation, discussions, educational games, practical exercises, and environmental projects, help students develop knowledge, skills, confidence, and critical thinking while making learning more enjoyable and meaningful. According to Iornyagh and Ihongu (2019), classroom activities provide students with opportunities to participate actively in lessons rather than simply listening to the teacher, thereby improving their understanding of scientific concepts. Agia, et al (2022) explained that classroom activities are instructional techniques used at different stages of a lesson, including lesson introduction, content delivery, and lesson conclusion. These activities not only improve students' engagement and learning outcomes but also strengthen relationships between teachers and students as well as among students themselves, supporting the use of innovative, learner-centred teaching methods.

Theoretically, the study is anchored on Vygotsky's Social Constructivist perspective 1978 and Kolb's Experiential Learning Theory 1984. Vygotsky's perspective state that learning is not an isolated activity but a social process in which learners develop knowledge and understanding through interaction with teachers, peers, and their surrounding environment. From this perspective, learners are active participants in the learning process rather than passive recipients of information. Meaningful interaction, discussion, collaboration, and guidance from more knowledgeable others can therefore support learners in developing new understanding and skills (Vygotsky, 1978). Kolb's Experiential Learning Theory, which views learning as a continuous process through which knowledge develops from experience. Kolb (1984) explains learning as a process involving the transformation of experience, in which learners engage in concrete experiences, reflect on those experiences, develop new ideas or concepts, and apply what they have learned in new situations. Thus, learning becomes more meaningful when students are given

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opportunities to actively participate, reflect on their experiences, and use newly acquired knowledge in practical or unfamiliar situations. Empirically, Ogbeba and Ajayi (2018) and Okoro and Olatunji (2019) reported that cooperative and activity-based learning approaches can help reduce gender disparities in science achievement. Similarly, Johnson and Johnson (2019) and Eriba and Samuel (2018) state that cooperative and group-based learning approaches enhance students' academic achievement by promoting collaboration, active participation, and meaningful engagement in the learning process.

STATEMENT OF THE PROBLEM

Despite the importance of Basic Science in developing students' critical thinking, problem-solving skills, and scientific knowledge, the academic performance of Basic 8 students remains unsatisfactory. One possible reason for this situation is the continued reliance on traditional teacher-centred teaching methods, particularly the conventional lecture method. In such classrooms, teachers often take the leading role in presenting information, while students are positioned mainly as passive recipients of knowledge. This approach may provide limited opportunities for students to participate actively, ask questions, interact meaningfully with their peers and teachers, and relate scientific concepts to their everyday experiences. Although previous studies have indicated that group learning can improve students' engagement and academic achievement, limited attention has been given to combining group learning with structured classroom activities specifically designed for Basic Science. Furthermore, there is limited empirical evidence on the effectiveness of this combined instructional approach among Basic 8 students in Makurdi Metropolis. This gap therefore provides a basis for examining whether integrating group learning with structured classroom activities can improve students' learning outcomes in Basic Science.

Purpose of the Study

The main purpose of this study is to investigate group learning strategy with classroom activities on academic performance of upper Basic 8 Science Students in Makurdi metropolis. Specifically the study seeks to:

1. determine the effects of group learning strategy, group learning strategy with classroom activities, and lecture method on the academic performance of Upper Basic 8 Science students in Makurdi Metropolis.
2. determine the influence of gender on the academic performance of Upper Basic 8 Science students exposed to group learning strategy in Makurdi Metropolis.

Research Questions

1. What are the effects of group learning strategy, group learning strategy with classroom activities, and lecture method on the academic performance of Upper Basic 8 Science students in Makurdi Metropolis?
2. What is the difference in the mean academic performance gain scores of male and female Upper Basic 8 Science students exposed to group learning strategy in Makurdi Metropolis?

Research Hypotheses

H_{01}: There is no significant difference in the mean academic performance scores of Upper Basic 8 Science students taught using group learning strategy, group learning strategy with classroom activities, and lecture method in Makurdi Metropolis.

H_{02}: There is no significant difference in the mean academic performance gain scores of male and female Upper Basic 8 Science students exposed to group learning strategy in Makurdi Metropolis.

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METHODOLOGY

The study adopted a quasi-experimental pretest–posttest design without random assignment to investigate the effect of group learning strategy with classroom activities on the academic performance of Basic 8 Science students in Makurdi Metropolis. From a population of about 20,000 students in 30 secondary schools, a sample of 150 students was selected using a multistage sampling technique and assigned to experimental and control groups. Data was collected using the Basic Science Performance Test (BSPT), which was validated by three experts and found to be reliable with a KR-21 reliability coefficient of 0.82 following a trail test involving 30 students. During the experiment, the experimental groups were taught Basic Science using GLS and Classroom Activities, while the control group received instruction through the lecture method for four weeks. The BSPT was administered before and after the treatment to measure students' performance. Data was 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.

RESULTS

Research Question One: What are the effects of group learning strategy, group learning strategy with classroom activities, and lecture method on the academic performance of Upper Basic 8 Science students in Makurdi Metropolis?

Table 1: Mean and Standard Deviation of Students' Academic Performance Scores

Instructional Strategy	N	Pre-test Mean	SD	Post-test Mean	Post-test SD	Mean Gain
Group Learning Strategy (GLS)	50	11.76	3.14	20.22	3.64	8.46
GLS + Classroom Activities	50	11.70	2.59	20.10	2.94	8.40
Lecture Method	50	10.34	2.44	17.46	3.46	7.12
Total	150	11.27	2.80	19.26	3.57	7.99

The table shows that students exposed to Group Learning Strategy (GLS) had a pre-test mean score of 11.76 and a post-test mean of 20.22, giving a mean gain of 8.46. Students exposed to GLS with Classroom Activities had a pre-test mean of 11.70 and a post-test mean of 20.10, resulting in a mean gain of 8.40. Those taught using the Lecture Method recorded a pre-test mean of 10.34 and a post-test mean of 17.46, with a mean gain of 7.12. Descriptively, the GLS group recorded the highest mean gain (8.46), followed closely by the GLS + Classroom Activities group (8.40), while the Lecture Method group recorded the lowest mean gain (7.12).

Hypothesis 1: There is no significant difference in the mean academic performance scores among Upper Basic 8 Science students taught using group learning strategy, group learning strategy with classroom activities, and lecture method in Makurdi Metropolis.

Table 2: ANCOVA of Students' Pretest-Post-test Academic Performance by Instructional Strategy

Source	Type III Sum of Squares	df	Mean Square	F	p	Partial η^2
Corrected Model	245.748	3	81.916	7.217	< .001	.129

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Pre-test	2.388	1	2.388	0.210	.647	.001
Instructional Strategy	219.031	2	109.516	9.649	< .001	.117
Error	1657.112	146	11.350			
Corrected Total	1902.860	149				

Note: R^2 = .129; Adjusted R^2 = .111. Dependent variable = Post-test academic performance.

Table 2 shows that there was a statistically significant difference in the post-test academic performance of students taught using GLS, GLS with Classroom Activities, and the conventional lecture method, after controlling for pre-test scores, $F(2,146) = 9.649$, $p < .001$. Therefore, the null hypothesis was rejected. The partial eta squared ($\eta^2 = .117$) indicates that instructional strategy accounted for approximately 11.7% of the variance in students' post-test performance, representing a moderate effect. Thus, the instructional strategies differed significantly in their effects on students' academic performance.

Research Question Two: What is the difference in the mean academic performance gain scores of male and female Upper Basic 8 Science students exposed to group learning strategy in Makurdi Metropolis?

Table 3: Mean Gain Scores by Gender

Gender	N	Pre-test		Post-test		Mean
		Mean	SD	Mean	SD	Gain
Male	24	11.96	2.63	21.25	3.69	9.29
Female	26	11.58	3.59	19.27	3.40	7.69
Mean Difference						**1.60**

Table 3 shows that the male Upper Basic 8 Science students had a pre-test mean score of 11.96 with a standard deviation of 2.63, which increased to a post-test mean score of 21.25 with a standard deviation of 3.69, resulting in a mean gain score of 9.29. In comparison, the female students had a pre-test mean score of 11.58 with a standard deviation of 3.59, which increased to a post-test mean score of 19.27 with a standard deviation of 3.40, giving a mean gain score of 7.69. The difference in mean gain scores was 1.60 in favour of the male students. This indicates that, although both male and female students improved in their academic performance after exposure to the group learning strategy, the male students recorded a slightly higher improvement than the female students. Hypothesis Two: There is no significant different in the mean performance scores of male and female students in Basic Science who are exposed to group learning strategy.

Table 4: ANCOVA of Academic Performance of Male and Female Students Taught Using Group Learning Strategy

Source	Type III Sum of Squares	df	Mean Square	F	p	Partial η^2
Corrected Model	52.324	2	26.162	2.055	.139	.080

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Pre-test	3.360	1	3.360	0.264	.610	.006
Gender	47.224	1	47.224	3.710	.060	.073
Error	598.256	47	12.729			
Corrected Total	650.580	49				

Note: R^2 = .080; Adjusted R^2 = .041. Dependent variable = Post-test academic performance.

Table 4 shows that there was no statistically significant difference in the post-test academic performance of male and female students taught using the Group Learning Strategy, after controlling for pre-test scores, $F(1,47) = 3.710$, $p = .060 > .05$. Therefore, the null hypothesis was not rejected. This indicates that gender did not have a statistically significant influence on students' academic performance under the Group Learning Strategy. The partial eta squared ($\eta^2p = .073$) indicates a moderate effect, although the effect did not reach statistical significance. Overall, the findings suggest that the Group Learning Strategy is gender-inclusive and provides comparable academic outcomes for both male and female students.

DISCUSSION OF FINDINGS

The findings showed that students taught using Group Learning Strategy (GLS), GLS with Classroom Activities, and Lecture Method all improved in academic performance, but the group-based approaches produced higher mean gains than the lecture method. GLS recorded the highest mean gain (8.46), followed closely by GLS with Classroom Activities (8.40), while the Lecture Method recorded 7.12. The ANCOVA result confirmed a significant difference among the three instructional strategies, $F(2,146) = 9.649$, $p < .001$, indicating that instructional strategy significantly influenced students' academic performance. The findings is consistent with the findings of Johnson and Johnson (2019) and Eriba and Samuel (2018), who reported that cooperative and group-based learning approaches can improve students' academic achievement by encouraging collaboration, active participation and meaningful engagement. Similarly, the present finding supports Ogbeba and Ajayi (2018) and Okoro and Olatunji (2019), who reported that cooperative and activity-oriented approaches can contribute to improved science learning outcomes. The present study therefore provides further evidence that moving away from predominantly teacher-centred instruction towards approaches that encourage students to participate and learn collaboratively can improve academic performance in Basic Science.

Regarding gender, male students recorded a higher mean gain (9.29) than female students (7.69); however, the difference was not statistically significant, $F(1,47) = 3.710$, $p = .060$. This suggests that GLS provided comparable learning opportunities for both male and female students and can therefore be considered a potentially inclusive approach to improving Basic Science achievement. The finding also supports the position of Ogbeba and Ajayi (2018) and Okoro and Olatunji (2019), who reported that cooperative and activity-based approaches can help reduce gender-related differences in science achievement. Although the present study recorded a descriptive advantage for male students, the difference was not statistically significant. This indicates that the higher male mean gain should not be interpreted as evidence that Group Learning Strategy is more effective for males. Rather, the overall result suggests that the strategy can support academic improvement among both male and female Upper Basic 8 Science students.

CONCLUSION

Based on the findings, the study concludes that Group Learning Strategy and Group Learning Strategy with Classroom Activities improved the academic performance of Upper Basic 8 Science students more than the Lecture Method. Although GLS recorded a slightly higher mean gain than GLS with Classroom

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Activities, the two group-based approaches produced closely comparable improvements. The significant ANCOVA result confirms that instructional strategy influenced students' academic performance. However, gender did not significantly influence the performance of students exposed to GLS, indicating that the strategy can support both male and female learners.

Recommendations

Based on the findings, the study recommends that:

1. Basic Science teachers should adopt Group Learning Strategy more frequently to encourage students' active participation, interaction and peer learning.
2. Teachers should incorporate meaningful classroom activities into group learning where appropriate to provide students with opportunities to apply scientific concepts in practical learning situations.
3. Schools should organise professional development programmes to equip Basic Science teachers with effective skills for planning and implementing group-based instructional strategies.

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