

Influence of Group Learning Strategy using Classroom Activities on Academic Performance among Basic 8 Science Students in Gboko Metropolis, Benue State, Nigeria

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Abstract

This study "Evaluate the Influence of Group Learning Strategies using Classroom Activities on the Academic Achievement of Basic 8 Science Students in Gboko Metropolis, Benue State." 2 research questions and 2 hypotheses guided the study. A quasi experimental, pretest post-test design was adopted for the study. A total of Basic 8 students from 30 secondary schools form the population for the study. A total of 150 students (60 males and 90 females) from 3 secondary school in Gboko metropolis selected by multi-stage sampling technique constituted the sample. One instrument namely. Basic science performance test developed by the researcher and validated were used for data collection. The reliability coefficient of the instrument was established through a pilot study using Kuder Richardson KR-21 formula which was found to be 0.82. The data collected were analyzed using mean, standard deviation and ANCOVA. The study revealed that students in the experimental group performed statistically significant higher mean scores than students in the control group. The study showed that there was gender disparity in mean academic performance when male and female students were taught using group learning strategy, and group learning strategy with classroom activities. The study also revealed that the interaction effect of gender and strategy had no significant effect on students' academic performance. Based on the findings the study recommends among other things that Basic science teachers should use group learning strategy with classroom activities as a medium of instruction to enhance performance in Basic Science.

Keywords: Basic Science, Group Learning Strategy, Classroom Activities, Academic Performance, Students

Introduction

The intellectual, technological, and economic underpinnings of society are shaped by science education, which is essential to national progress. Concerns regarding junior secondary school pupils' poor performance in Basic Science have led to proposals for pedagogical changes in Nigeria. In order to promote deeper comprehension and academic accomplishment, new solutions like group learning and structured classroom activities are necessary because traditional lecture approaches frequently fail to engage students actively. Since science plays such a broad and significant role in today's world, Atoo (2018) emphasized the value of scientific knowledge in raising a nation's natural prestige, military prowess, national wealth, and international standing. Science and technology give birth to the production of micro-computers and their innovative applications which earned the developed countries such as United States of America and Japan unparalleled national wealth, military potential and enviable national prestige. It is a basic fact that, for an individual to be well groomed in science and be competent enough to face the challenges of life in his or her society he or she must have a good foundation in science and technology. This is because science and technology has contributed enormously in solving societal problems in many areas such as health, nutrition, food, security, and transportation, security sports, among others (Tofi, et al, 2017). As a result of science and technology, education is increasingly conducted in non-traditional settings outside of schools, such as homes, workplaces, industries, and marketplaces. Nigeria and other countries around the world are working hard to advance technologically and scientifically because it has broken down barriers to education, whether they be economic, demographic, or environmental (Atoo, 2018) (Adejoh, et al, 2013). (Okwara, et al, 2019) claim that countries that are regarded as developed and generally civilized have attained that status by strategically and purposefully educating their



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citizens in science. Science education in Nigeria has become significant because it is needed to produce technologists, technicians, scientists, craftsmen and skilled artisans who are required to change the economy which would in turn lead to a rapid growth and development necessary for nations to cope with the present day challenges (Samuel, 2018). However, science education cannot achieve the goal of producing technologist, technicians, scientists, craftsmen and skilled artisans for national development when the achievement of students in science subjects especially Basic Science and Technology which is the foundation of science education is not encouraging enough. 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. As stated by Okwara et al. (2019), the state of basic science and technology performance is caused by a number of factors, including a lack of qualified basic science and technology teachers, a lack of students' exposure to class activities, a lack of preparation on the part of teachers and students, and an inability to successfully implement the curriculum. (Adeniran, et al 2018) attribute the low performance in the Basic Science course to a number of factors, including incompetent teachers, inadequate facilities and resources for instruction, poor student backgrounds, inadequate funding for science and technology education, a lack of awareness among the majority of parents, a lack of motivation among teachers and students, and poor administration by different institution heads.

The poor performance of students in Basic Science remains a major concern for teachers, parents, and education stakeholders in Nigeria. Despite government efforts such as curriculum reforms, teacher training, provision of laboratory equipment, and the promotion of innovative teaching methods, students' achievement has remained unsatisfactory. Contributing factors include ineffective teaching methods, inadequate teacher preparation, insufficient learning resources, poor infrastructure, overcrowded classrooms, and socio-cultural influences. Although the integration of technology, group learning strategies, and classroom activities has the potential to improve learning outcomes, their effectiveness is often limited by inadequate resources and resistance to change. Therefore, improving students' performance in Basic Science requires sustained investment in educational infrastructure, teacher professional development, and the adoption of learner-centered instructional approaches. The teaching of Basic Science should be students centered, activity oriented where rote learning and memorization is discouraged. For this purpose, the use of discovery teaching strategy, the inclusion of group learning and the involvement of students in open ended field or laboratory exercises have been advocated for, (Ityokyaa and Adejoh, 2014). All these strategies recommended are inquiry based. For an individual to be productive and functional in a changing society, he or she must acquire the right attitude and functional skills which can only be cultivated in learners through appropriate teaching of science using innovative strategies. Basic Science forms the bedrock of scientific literacy and serves as a precursor to advanced scientific studies and technical education. However, performance metrics have consistently indicated low proficiency levels among Nigerian students, attributed to factors such as outdated teaching practices, inadequate facilities, and a lack of student engagement. The Benue State Examinations Board (2023) reported that while over 78,000 candidates took the Basic Science examination, fewer than 30% attained distinction a clear signal of systemic gaps. To bridge these gaps, this study focuses on the application of group learning strategies and classroom activities, both of which align with contemporary constructivist and experiential learning paradigms. These approaches emphasize student-centered learning, collaboration, and the practical application of scientific concepts, contrasting sharply with the passive reception of information typical of lecture-based teaching. By integrating these methods, educators can create a more interactive and inclusive classroom environment that supports critical thinking, peer interaction, and higher retention.

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). (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 leaning 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 for the whole 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



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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 practical and interactive learning experiences designed to improve students' understanding, critical thinking, skills, and overall engagement in the learning process. These activities, such as observation, investigation, discussion, games, and practical exercises, help students apply theoretical knowledge while promoting confidence and active participation (Iornyagh & Ihongu, 2019). According to Agia et al. (2022), classroom activities are instructional techniques used at different stages of a lesson introduction, content delivery, and conclusion to enhance students' learning, engagement, and interaction, while fostering positive relationships between teachers and students as well as among learners. Theoretically, Vygotsky Social Constructivism propounded in 1978, which states that learning is a social process, and knowledge is constructed through interaction and collaboration with others and Experiential Learning Theory propounded by David Kolb's, in 1984, which states that learning is a dynamic process that occurs through experience and active engagement. Kolb argued that knowledge is created through the transformation of experience, where individuals interact with their environment, reflect on their actions, and adapt their understanding. Empirically, Slavin (2021), Ogbeba and Ajayi (2018), Okoro and Olatunji (2019), who reported that cooperative and activity-based learning minimize gender disparities in science achievement. Johnson and Johnson (2019) and Eriba and Samuel (2018), who emphasized that cooperative and group-based learning approaches enhance academic achievement through collaboration and active engagement.

Statement of the Problem

The academic performance of Basic 8 science students is a major educational concern, as many students perform poorly due to traditional teacher-centered methods that limit engagement and collaboration. Although previous studies have shown that group learning strategies can improve critical thinking, cooperation, and understanding, few have examined their use alongside structured classroom activities specifically designed for science lessons. Additionally, there is limited research on this approach in Gboko Metropolis. Therefore, this study seeks to investigate the effects of group learning strategies combined with classroom activities on the academic performance of Basic 8 science students in Gboko Metropolis.

Purpose of the Study

The main purpose of this study is to "Evaluate the influence of Group Learning Strategies using Classroom Activities on the Academic performance of Basic 8 Science Students in Gboko Metropolis, Benue State." Specifically the study seeks to:

1. Determine whether the effect of group learning strategy using classroom activities on students' performance is gender biased
2. Determine the extent to which interaction of methods and gender affects students' performance in Basic Science

Research Questions

1. How does gender have influence on the performance of students when exposed to group learning strategy using classroom activities?
2. How would interactions of methods and gender affect students' performance in Basic Science?

Hypotheses

1. There is no significant difference between the mean performance scores of male and female students in Basic Science who are taught Basic Science using group learning strategy using classroom activities.
2. There is no significant interaction effect of methods and gender on mean students' performance in Basic Science

Research Methodology

The data that was collected in the course of this study was analyzed using statistical tools for data analysis which is descriptive and inferential statistics. Research questions were answered using mean scores and standard deviation while the null hypotheses were tested using Analysis of Covariance (ANCOVA) at a 0.05 level of significance. A quasi-experimental pretest-posttest design without random assignment was employed. The study population included approximately 20,000 Basic 8 students across 30 schools in Gboko Metropolis. A multistage sampling technique selected 150 students divided equally among experimental (group learning and activities) and control (lecture-based) groups. The BSPT instrument assessed performance pre- and post-intervention. The instrument was adopted by the researcher,

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validation by three experts from the Department of Science and Mathematics Education, Rev Fr Moses Orshio Adasu University, Gboko. Kuder Richardson Formula KR-21 was used to determine the reliability of BSPT. The Reliability Coefficient obtained was 0.82. Through a trial test conducted on 30 students who are part of the population but are not part of the sample for the study. The experimental groups were taught Basic Science concepts using Group learning strategy with Classroom Activities while the control groups were taught same concepts using Lecture method. The treatment was conducted in four weeks. After the four weeks teaching, the posttest was administered with the same BSPT. The BSPT scores were subjected to Analysis of Covariance (ANCOVA).

Presentation of Results

Research Question One: How does gender have influence on the performance of students when exposed to group learning strategy with classroom activities?

Table 1: Mean and Standard Deviation of Performance of Male and Female Students taught Basic Science using Group Learning Strategy with Classroom Activities (GLS+CA).

Gender		Pre-test	Post-test	Mean Gain
Male	Mean	11.46	20.23	8.77
	N	26	26	
	Std. Deviation	3.09	2.96	0.13
Female	Mean	11.96	19.96	8.00
	N	24	24	
	Std. Deviation	1.94	2.97	1.03
Mean Difference				0.77

Table 1 shows that both male and female Basic 8 students improved their academic performance in Basic Science after being taught using the Group Learning Strategy with Classroom Activities (GLS+CA). Male students' mean score increased from 11.46 (pre-test) to 20.23 (post-test), giving a mean gain of 8.77. Female students' mean score improved from 11.96 to 19.96, with a mean gain of 8.00. The difference in mean gain was 0.77 in favor of male students. The post-test standard deviations were 2.96 for males and 2.97 for females, indicating a similar level of consistency in performance. Overall, the findings suggest that GLS+CA was effective for both genders, with only a slight advantage for male students and no significant gender gap in achievement.

Hypothesis One: There is no significant difference between the mean performance scores of male and female students in Basic Science who are taught Basic Science using group learning strategy with classroom activities.

Table 2: ANCOVA of Mean Performance Scores of Male and Female Students taught Basic Science using Group Learning Strategy with Classroom Activities.

Dependent Variable: Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Squared	Eta
Corrected Model	4.951 ^a	2	2.475	.279	.758	.012	
Intercept	800.065	1	800.065	90.057	.000	.657	
Pretest	4.024	1	4.024	.453	.504	.010	
Gender	1.327	1	1.327	.149	.701	.003	
Error	417.549	47	8.884				
Total	20623.000	50					
Corrected Total	422.500	49					

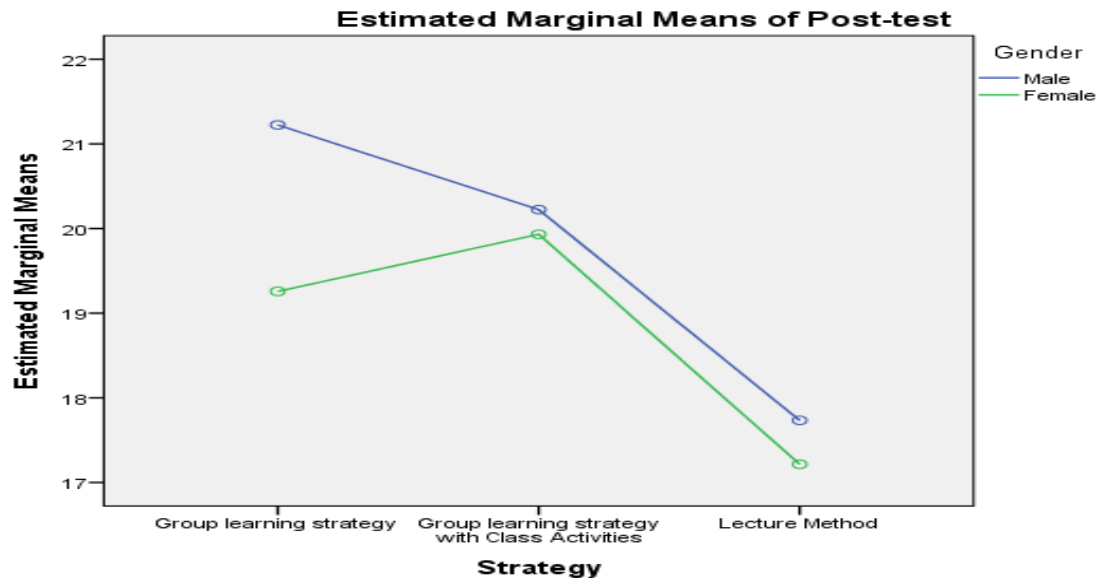
a. R Squared = .012 (Adjusted R Squared = -.030)

Table 2 indicates that there was no statistically significant difference in the academic performance of male and female students taught Basic Science using the Group Learning Strategy with Classroom Activities (GLS+CA). The analysis produced an F-value of 0.149 with a p-value of 0.701 ($p > 0.05$), leading to the acceptance of the null hypothesis. This means that both male and female students performed similarly after the intervention. Furthermore, the partial eta squared (η^2) value of 0.003 shows that gender accounted for only 0.3% of the variance in students' performance, indicating a very small effect size. Overall, the findings suggest that GLS+CA is equally effective for both male and female students.

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Research Question Two: How would interactions of methods and gender affect students' performance in Basic Science?

Table 3: Pair Wise Comparisons for Mean Academic Performance Scores of Students in Basic Science who are taught using Group Learning, Group Learning Strategy with Classroom Activities and conventional strategies



Covariates appearing in the model are evaluated at the following values: Pre-test = 11.27

Figure 1: Graphical Representation of Interaction Effect of Strategies and Gender on Students' Performance in Basic Science.

Dependent Variable: Post-test

(I) Strategy	(J) Strategy	Mean Difference (I-J)	Std. Error	Sig. ^b
Group learning strategy (GLS)	Group learning strategy with Class Activities	.163	.671	1.000
	Lecture Method	2.766*	.687	.000
Group learning strategy with Class Activities (GLS+CA)	Group learning strategy	-.163	.671	1.000
	Lecture Method	2.603*	.686	.001
Lecture Method (LM)	Group learning strategy	-2.766*	.687	.000
	Group learning strategy with Class Activities	-2.603*	.686	.001

Based on estimated marginal means *. The mean difference is significant at the .05 level

Table 3 shows that there was no significant difference in the academic performance of students taught using Group Learning Strategy (GLS) and Group Learning Strategy with Classroom Activities (GLS+CA), with a mean difference of -0.163, SE = 0.671, and $p = 1.000$ ($p > 0.05$). However, both instructional strategies were significantly more effective than the Lecture Method (LM). Students taught with GLS performed significantly better than those taught with LM (mean difference = 2.766, SE = 0.687, $p = 0.000$), while students taught with GLS+CA also outperformed those taught with LM (mean difference = 2.603, SE = 0.686, $p = 0.001$). The reverse comparisons (LM vs. GLS and LM vs. GLS+CA) further confirmed these significant differences ($p \leq 0.001$). Overall, the findings indicate that both GLS and GLS+CA are equally effective and produce significantly higher academic performance than the traditional lecture method.

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Hypothesis Two: There is no significant interaction effect of methods and gender on mean students' performance in Basic Science

Table 4: ANCOVA of Interaction Effect of Methods and Gender on Mean Students' Performance in Basic Science

Dependent Variable: Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Squared	Eta
Corrected Model	298.312 ^a	6	49.719	4.431	.000	.157	
Intercept	2897.602	1	2897.602	258.239	.000	.644	
Pretest	1.575	1	1.575	.140	.709	.001	
Strategy	226.148	2	113.074	10.077	.000	.124	
Gender	31.995	1	31.995	2.851	.093	.020	
Strategies* Gender	20.552	2	10.276	.916	.403	.013	
Error	1604.548	143	11.221				
Total	57545.000	150					
Corrected Total	1902.860	149					

a. R Squared = .157 (Adjusted R Squared = .121)

Table 8 reveals that $F(2,143) = 0.916$; $p = 0.403 > 0.05$. Since p-value is greater than the significance level of 0.05, the null hypothesis is not rejected. This means that, no significant interaction effect exists between teaching strategies and gender on students' performance in Basic Science. The partial eta squared value of 0.013 for the strategies and gender implies that 13% of the difference in the students' performance can be accounted for by the strategies and gender. This indicates a low effect size.

Discussion of Findings

The study investigated the effects of Group Learning Strategy (GLS), Group Learning Strategy with Classroom Activities (GLS+CA), and the Lecture Method (LM) on Basic 8 students' achievement in Basic Science. The results showed that students exposed to GLS+CA recorded the highest mean gain (8.46), followed closely by GLS (8.40), while those taught with the Lecture Method had the lowest gain (7.12). The overall difference among the teaching strategies was statistically significant ($F(2,146) = 9.649$, $p < 0.05$), indicating that instructional method significantly affects students' performance. However, there was no significant difference between GLS and GLS+CA ($p > 0.05$), though both strategies significantly outperformed the lecture method ($p < 0.05$). This supports the view of Johnson and Johnson (2019) and Eriba and Samuel (2018), who emphasized that cooperative and group-based learning approaches enhance academic achievement through collaboration and active engagement. In terms of gender, students taught with GLS showed a slightly higher mean gain for males (9.29) than females (7.69), but the difference was not statistically significant ($F(1,47) = 3.710$, $p > 0.05$; $\eta^2 = 0.073$). Similarly, under GLS+CA, male students recorded 8.77 compared to 8.00 for females, also not significant ($F(1,47) = 0.149$, $p > 0.05$; $\eta^2 = 0.003$). This indicates that both strategies are gender-inclusive and equitable, consistent with the findings of Slavin (2021), Ogbeba and Ajayi (2018), and Okoro and Olatunji (2019), who reported that cooperative and activity-based learning minimize gender disparities in science achievement. Furthermore, the interaction effect between teaching strategies and gender was not significant ($F(2,143) = 0.916$, $p > 0.05$; $\eta^2 = 0.013$), meaning that the effectiveness of the teaching methods did not depend on gender. This aligns with findings by Usoro (2023) and Ibhafidon and Aduwa (2020), who concluded that student-centered instructional methods produce consistent learning gains across genders. Overall, the study supports the position of Adeyemi (2017) that participatory and cooperative teaching strategies significantly enhance academic achievement and promote equity in Basic Science education.

Conclusion

Based on the findings, it is evident that group learning strategies supported by classroom activities are more effective than traditional lecture methods in enhancing students' performance and interest in Basic Science. Therefore, implementing such strategies can contribute meaningfully to improved academic outcomes and student engagement at the Basic 8 level. Adopting these strategies can significantly contribute to raising science achievement and fostering a scientifically literate society.

Recommendations

1. Science teachers should adopt group learning strategies enhanced with classroom activities to improve academic outcomes in Basic Science.



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2. Curriculum planners should integrate cooperative learning models like Science-Text-Cards (STC) in the Basic Science curriculum.
3. School administrators should provide necessary support in terms of training and resources to implement active learning strategies

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